PIT AND QUARRY

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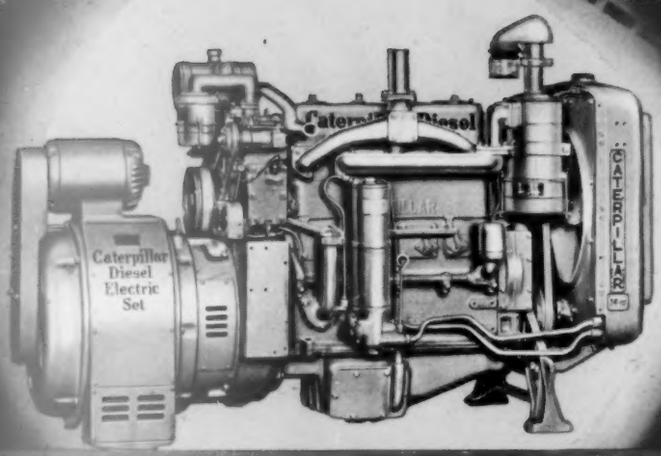
SEPTEMBER, 1939

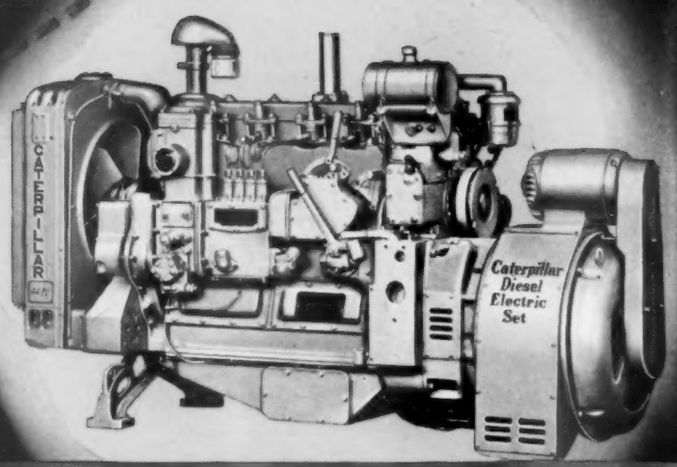
Temporary Plants Aid Oregon Producer . . . Cures Concrete Units in Steam Rooms on Wheels
The Government Investigates the Building Industry . . . Details of a Recent Quarry Blast

TWO NEW POPULAR-SIZE "CATERPILLAR" DIESEL-ELECTRIC SETS

THAT GENERATE ELECTRICITY AT ROCK-BOTTOM COST

*1¢ per KWH**





FOR lighting excavating operations, gravel plants, stone-cutting mills, for tool-shop, water supply, auxiliary or miscellaneous power needs — no other similar source of electric current combines the dependability, simplicity and economy of these new "Caterpillar" Diesel-Electric Sets. Operate them a few hours a day or all twenty-four; a few months a year or all twelve — use as little or as much as you like — there are no penalties, premiums or "special charges" to pay. *And only about 1c per kwh. for electric current!**

Completely self-contained and self-regulating, these compact plants are easy to locate in small space; easy to start and run; easy to maintain. . . . *And easy to buy!* Set consists of the carefully built and performance-tested "Caterpillar" Diesel Engine, direct-connected through special cushioned coupling to quality-constructed "Caterpillar" Generator. Known the world over, this engine is free from frequent and delicate adjustments (absolutely none required on fuel system). Under ordinary care, maintenance costs are trivial, repairs seldom, and long life certain.

Generator, of sturdy design, is of the double-ball-bearing type, and is made for long trouble-free service. Built-in regulation permits starting large motors with only minor light fluctuations. No "gadgets," no complicated controls, no elaborate electrical installation. . . . A simple, low-cost set-up with power as readily available as water from a faucet! See any "Caterpillar" dealer, or write us direct for literature — and any information on any specific light or power problem.

**Slightly more or less, depending on local price of Diesel fuel and average loads.*

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

The 34-15 (*left*) — supplied in 3-phase, 110, 220 or 440 volts at 15 kw. Also as single-phase 110/220 volt 3-wire type and 110, 220 or 440 volt 2-wire type at 13 kw. The 44-20 (*right*) — supplied in 3-phase, 110, 220 or 440 volts at 20 kw.

CATERPILLAR
REG. U.S. PAT. OFF.
DIESEL POWER

DIESEL ENGINES—32 TO 160 HORSEPOWER (maximum rating)
DIESEL-ELECTRIC SETS—13 TO 90 KW. (continuous rating)

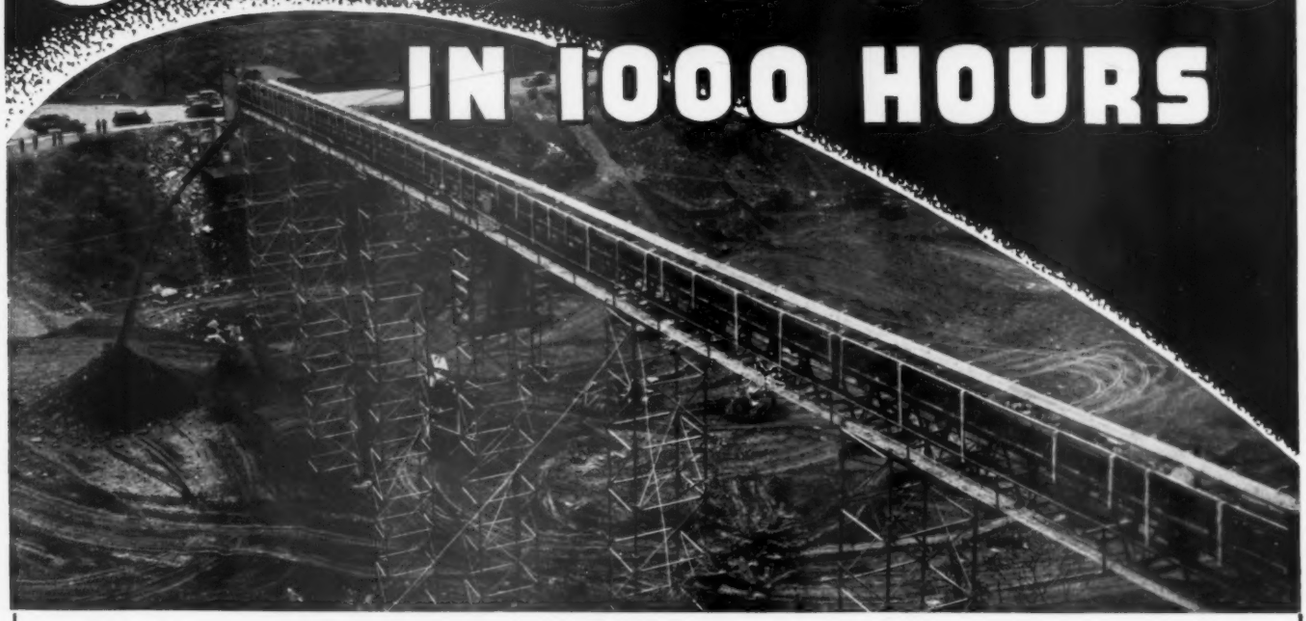
CATERPILLAR TRACTOR CO., Peoria, Illinois

Please send further information on the new 44-20 and 34-15 "Caterpillar" Diesel-Electric Sets. Kind of plant or purpose

Name_____

Address_____

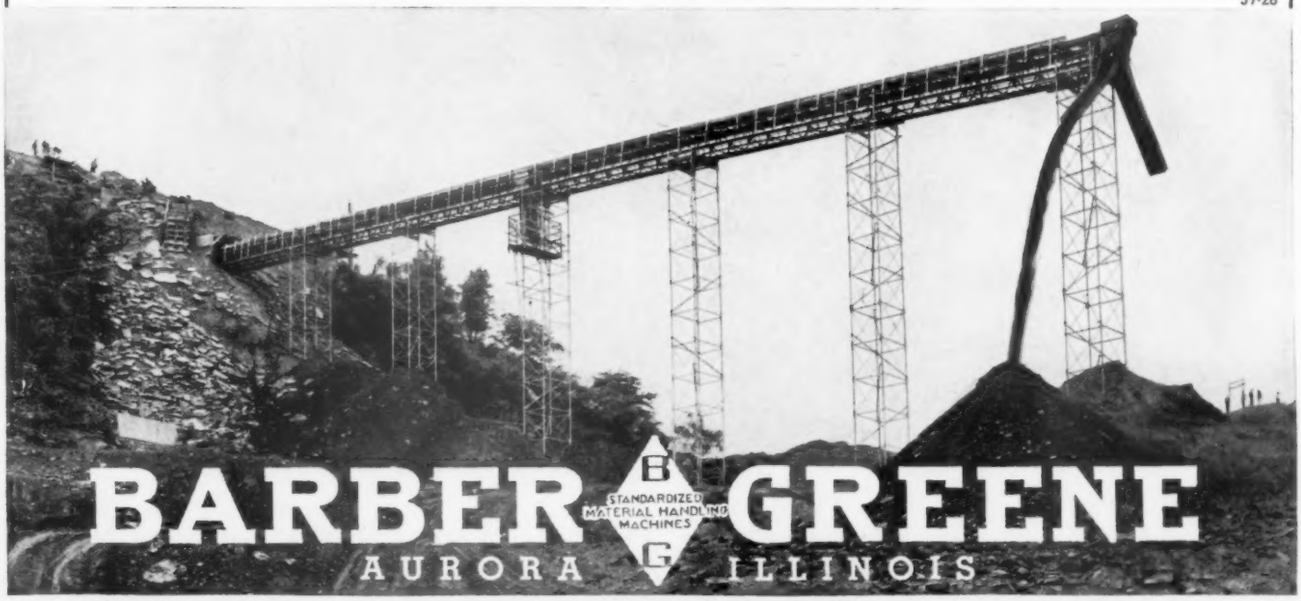
moving 800,000 TONS IN 1000 HOURS



IN this interesting Pittsburgh job, the Harrison Construction Company is moving 800,000 tons with this Barber-Greene 42″ x 350′ Belt Conveyor at 800 tons per hour. The top of a hill is being removed for a housing project, and the excavated material conveyed out into a valley as a fill for a future playground. The excavated material, which includes stones as large as 20″ x 24″, is received by two Barber-Greene apron feeders which feed the B-G Conveyor. The Harrison Construction Company had many reasons for selecting Barber-Greene: quicker delivery; easier erection; drives and take-ups all factory assembled and aligned; and high versatility.

Barber-Greene's Standardized Sectional Construction will enable them to adapt their conveyor to practically any future job, and always insure a high resale value. Write for the Barber-Greene Conveyor Catalog. There is no obligation.

39-26



BARBER GREENE

STANDARDIZED MATERIAL HANDLING MACHINES

AURORA ILLINOIS

PIT AND QUARRY, September, 1939. Vol. 32, No. 3. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price $1 for 1 year in the U. S. and possessions, Canada, Central and South America; elsewhere $1 additional for each year. Single copies 20 cents. Entered as second-class matter February 28, 1932, at the Post Office at Chicago, Ill., under the act of March 3, 1897.

BROKEN CYCLES *Shoot your Profits*

TOP ILLUSTRATION: One of 3 Cummins Diesel-powered Hugs owned by the Big Rock Stone and Material Company, Little Rock, Ark. Each unit saves $6.80 per day in fuel costs over previous equipment in addition to carrying one-fourth larger loads at 10% greater speed.

RIGHT: U. S. Transit-Mix of New York City is using this Lima crane (75' boom and 2-yd. clamshell bucket) powered with a 6-cyl., Model K Cummins Diesel on the huge Delaware Watershed project which will give New York another source of water supply.

Whether the haul from shovel to crusher is long or short, a breakdown anywhere along the line can easily disrupt the entire cycle of work and skyrocket your costs. Assure a smooth continuity of production with Cummins Diesel power . . . the power that is always dependable, always economical. Any job you want done is being done with Cummins Dependable Diesels. Cummins Engine Company, 3816 Wilson Street, Columbus, Indiana.

CUMMINS
Dependable
DIESELS

PRINT IN BINDI

Another Record in ROCK FOR LORAINS

THEW CENTER DRIVE

● Eleven years in continuous rock service and still going strong! That's the record of Lorain shovels in the quarries of the Massachusetts Broken Stone Co. Shovel No. 1 went to work in 1928. It gave such a convincing demonstration of power, strength and endurance that the owner standardized on Lorains exclusively—has purchased 12 of them to date.

Lorain No. 12 is this Lorain-79—the most efficient rock shovel ever to bear the Lorain name. It has a real "front end," an all-welded boom combining brute strength with unusual torsional resistance, which literally laps up rock. Double Center Drive design of turntable not only puts more "Umph" into crowd, hoist and swing but provides perfect power control for boulder balancing when setting aside the big ones. And the Lorain-79's 2-speed Center "Chain" Drive crawler wins in a walk.

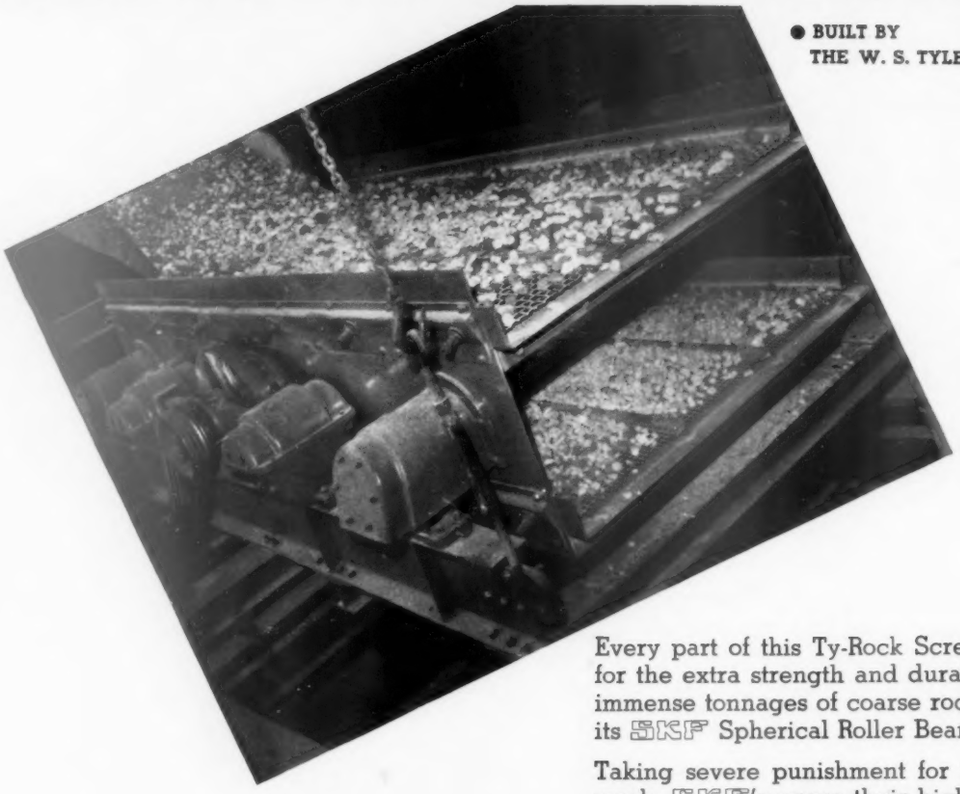
Write for catalog describing the 1½-yd. Lorain-79—the modern, big capacity shovel with a proven record in rock.

1½ YD. LORAIN 79

THE THEW SHOVEL COMPANY
LORAIN, OHIO

N BINDING

HEAVY DUTY TY-ROCK SCREENS
HAVE HUSKY BEARINGS



● BUILT BY
THE W. S. TYLER CO.

Every part of this Ty-Rock Screen is ruggedly constructed for the extra strength and durability required for handling immense tonnages of coarse rock or ore. And that includes its SKF Spherical Roller Bearings, too.

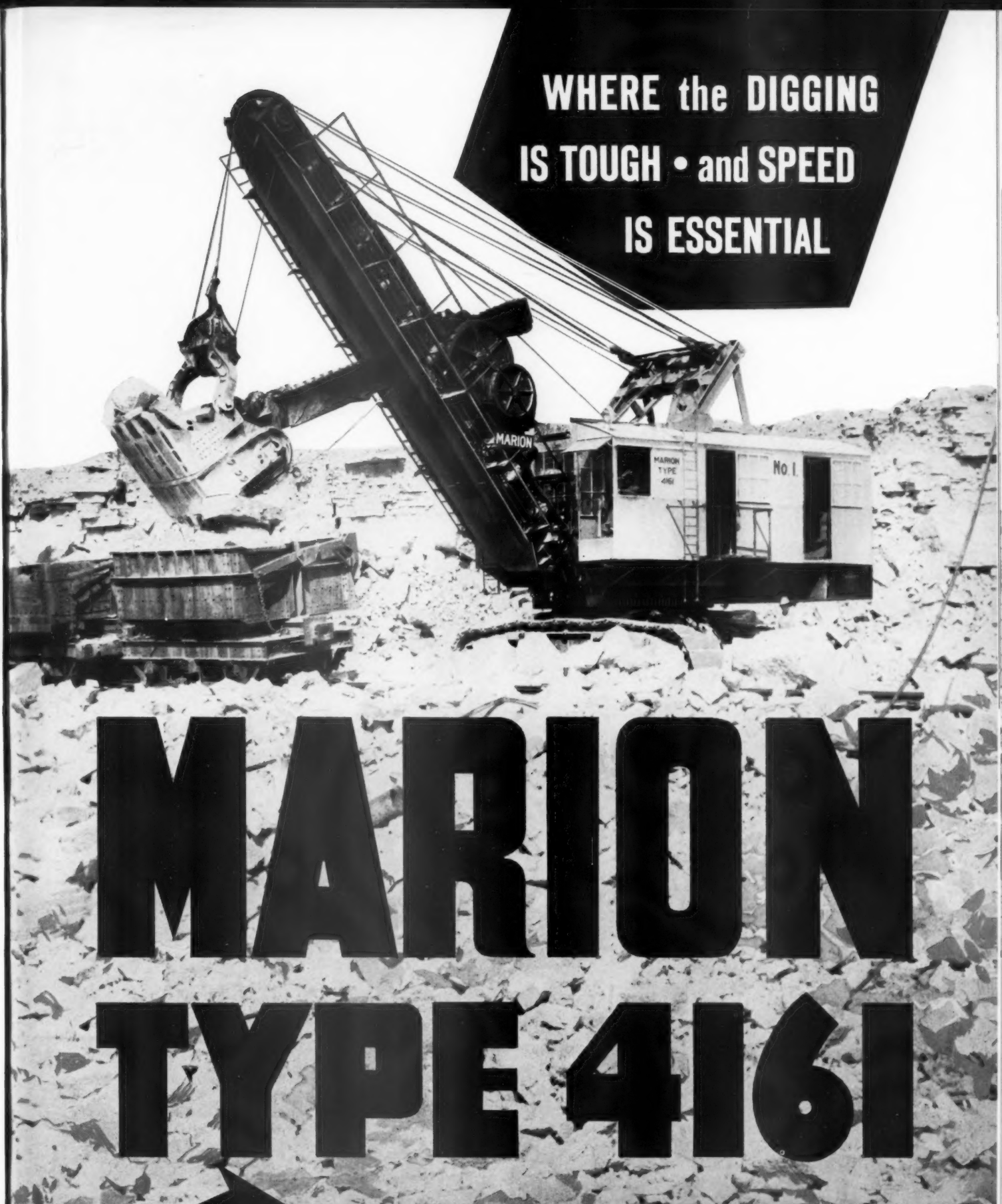
Taking severe punishment for 24 hours a day, week after week, SKF's prove their high capacity, wear resistance, self-alignment and many other advantages that mean long life and low cost operation.

Your nearest SKF representative stands ready to show *you* how SKF Bearings can increase operating efficiency and cut the maintenance costs of your equipment. Why not see him TODAY? 4374

SKF INDUSTRIES, INC., FRONT ST. & ERIE AVE., PHILA.

THE BEARINGS ARE
SKF

BALL & ROLLER BEARINGS



WHERE the DIGGING IS TOUGH • and SPEED IS ESSENTIAL

MARION TYPE 4161

MODERNIZE with MARIONS

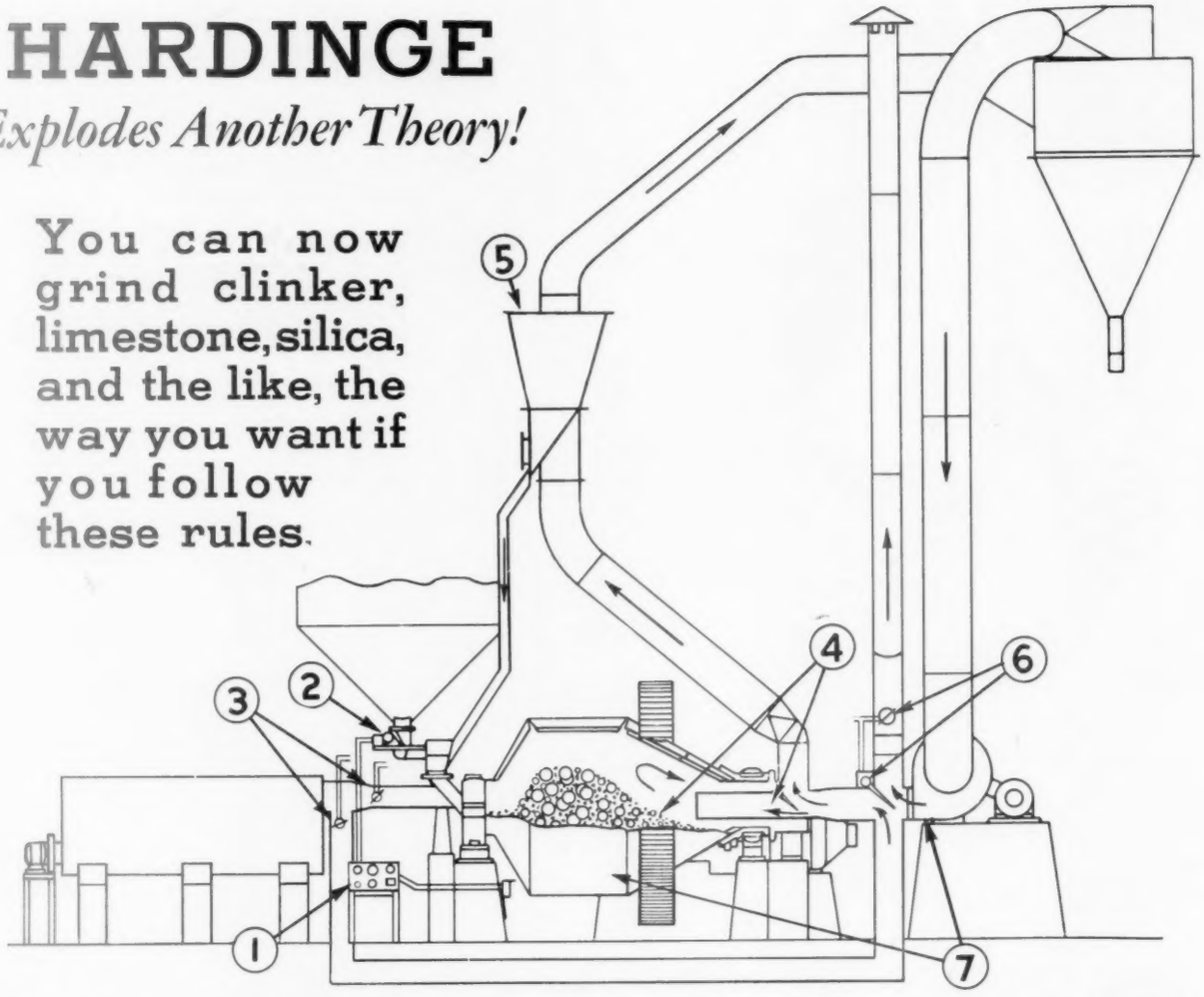
Open pit mining . . . quarries . . . ore handling . . . hydro-electric developments . . . and heavy construction is the work picked out for this sturdy, heavy duty Marion . . . one of the most popular in the MARION line. Its long suit is maximum yardage at low operating cost. Write for Bulletin 369 which gives you the facts about this machine. There is a MARION of the right size and capacity . . . from 3/4 cu. yd. up. . . . for every material handling job. » » »

THE MARION STEAM SHOVEL CO., MARION, OHIO, U. S. A.

HARDINGE

Explodes Another Theory!

You can now grind clinker, limestone, silica, and the like, the way you want if you follow these rules.



Rule 1—Control the feed rate by automatic means to compensate for continuous changes in feed size and hardness.

Rule 2—Use a feeder that records the weight fed and also signals the operator when the bin is empty or arches.

Rule 3—Remove excess moisture in the feed (if any present).

Rule 4—Control grinding action so as to secure the physical properties needed, particularly when sub-sieve (micron) sizes are desired.

Rule 5—Control the fineness within close limits, to meet specifications at all times.

Rule 6—Keep the temperature in the grinding system constant.

Rule 7—Use a grinding system that requires a minimum of power and maintenance.

Here's How Hardinge Obeys the Rules

1.— The "Electric Ear," using the sound of the mill as the indicator, controls the feed so as to compensate instantaneously for changes in feed size and hardness.

2.— The Constant Weight Feeder feeds by weight and signals the operator or starts a bin rapper the moment it fails to receive feed.

3. The "Thermo-Mill" system drys as the mill grinds and through thermostatic control keeps temperature constant at all times within the system.

4.— By control of ball size as well as air in the mill independently of that required in the classifier, any character of product desired can be secured at will, even when an excess of micron sizes is wanted.

5.— The Hardinge Superfine Classifier with dual fineness regulating feature controls the fineness within close limits.

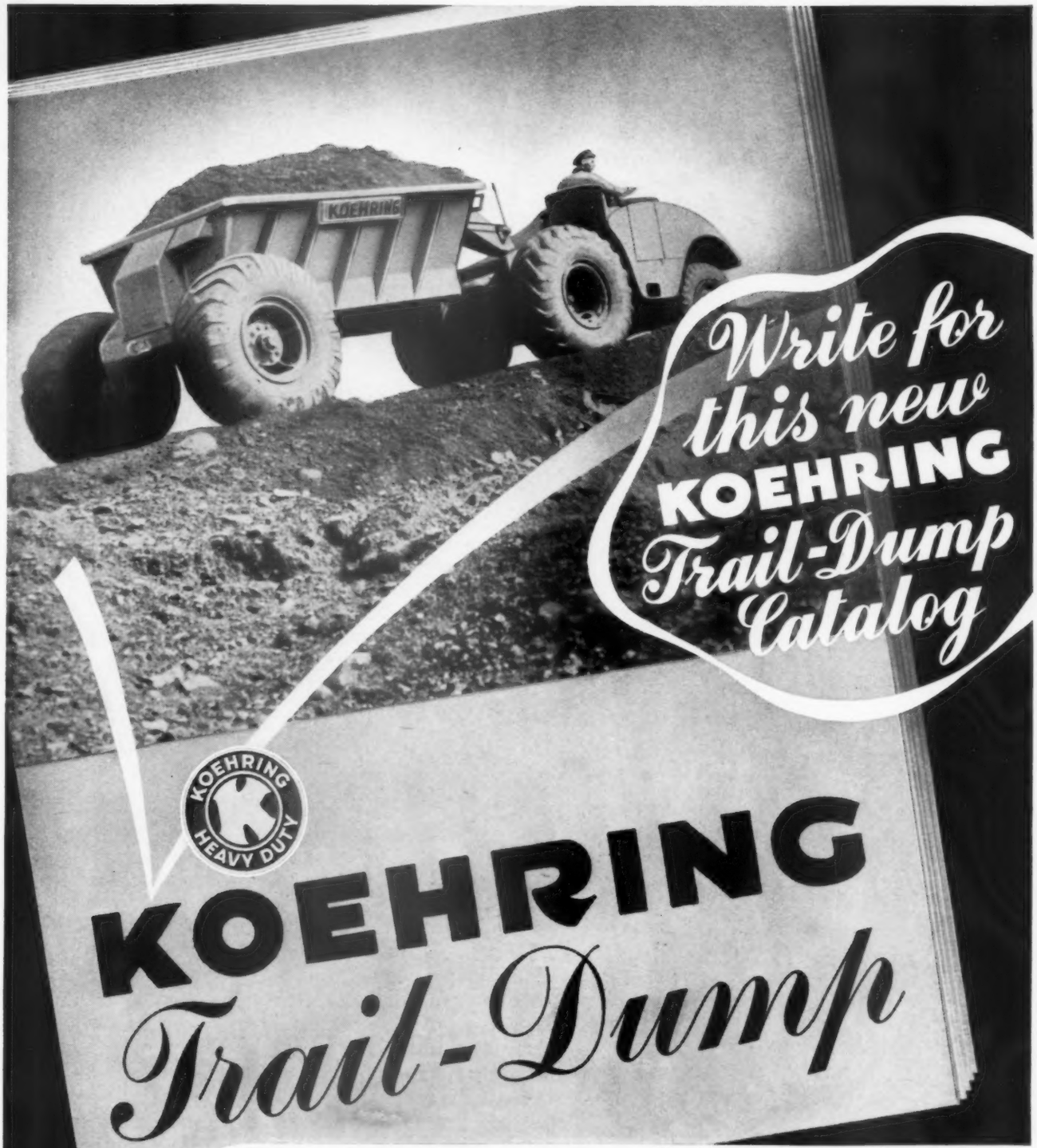
6.— When moisture is in the feed, it must be dried, or if the material being ground is sensitive to high temperature—heat of grinding—it must be controlled. Thermostatic control of the air in the system takes care of this important point.

7.— The Hardinge Mill holds the record for low maintenance, particularly on abrasive material. The conical shape creates ball classification and proportions the sizes to the work to be done, thus reducing power. The fan handles only clean air.

HARDINGE COMPANY *INCORPORATED*

YORK, PENNSYLVANIA, *Main Office and Works*

NEW YORK, 122 E. 42nd St. CHICAGO, 205 W. Wacker Drive SAN FRANCISCO, 501 Howard St. DENVER, 817 17th St.



Write for this new KOEHRING Trail-Dump Catalog

KOEHRING HEAVY DUTY

KOEHRING Trail-Dump

A NEW CATALOG ON HAULING EQUIPMENT!

It contains a complete description of the New Koehring Trail-Dump ...tells how you can save money on your dirt-hauling jobs . . . fully illustrated . . . mail the coupon today.

KOEHRING COMPANY
3026 W. Concordia Ave., Milwaukee, Wis.

SEND NEW TRAIL-DUMP CATALOG TO

COMPANY NAME_____

BUSINESS_____

SIGNED BY_____

TITLE_____

STREET ADDRESS_____

CITY_____ STATE_____

HEAVY-DUTY CONSTRUCTION EQUIPMENT

UNPARALLELED PERFORMANCE

LIMA has won nation wide recognition on a wide variety of jobs--road building, metal mining, steel erection and material handling, levee work, coal stripping, general construction, brick making, lumbering, conservation work, quarry operations, and sand and gravel production. These varied jobs present many difficult digging problems, but without exception LIMA comes through with unparalleled performances.

WON FOR LIMA FIRST PLACE ON A WIDE VARIETY OF JOBS

follow the trend

LIMA

SHOVELS - DRAGLINES - CRANES

LIMA LOCOMOTIVE WORKS, Incorporated
SHOVEL and CRANE DIVISION LIMA, OHIO, U. S. A.

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NEWARK, N. J. 317 Frelinghuysen Ave.
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SAN FRANCISCO, 235 Bayshore Boulevard
LOS ANGELES, 2001 Santa Fe Ave.
SEATTLE, 1932 First Ave. South
PHILADELPHIA, 1744 Sedgley Avenue
Tyee Machinery Company, Vancouver, B. C

"Good Morning... THIS IS WESTINGHOUSE"

Look in the telephone directory in any one of 137 cities, strategically located from Coast to Coast, and you'll find a Westinghouse number that will give you prompt and capable service.

If it's electrical shovel equipment you need, fine. Or, if it's just a minor repair job, you'll get *action* from the minute the Westinghouse operator says "Good morning."

This is just another reason why you should concentrate your electrical purchases with Westinghouse. These well-located offices give you overnight service on almost any requirement . . . and can arrange special action from the factories, when necessary.

For any electrical requirement — call Westinghouse.

J-94076

MATCHED PERFORMANCE "FROM CATS TO BULL-WHEEL"

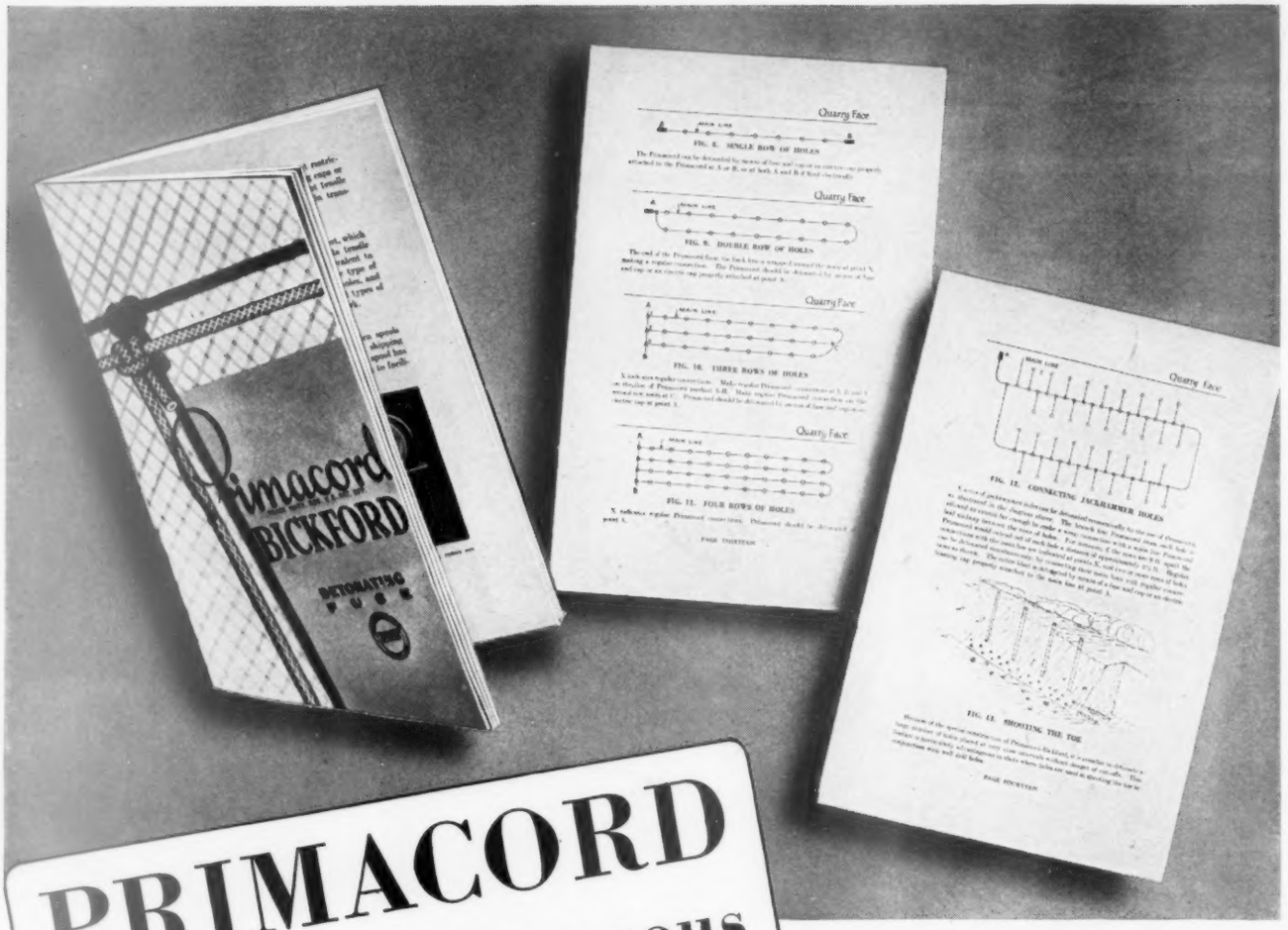
Westinghouse electric equipment for power shovels is noted for its ability to stand up under the grinding, grueling wear and tear to which shovels are subjected. Only by matching every element to the job to be done, to give uniform performance from "cats to bull-wheel," can such results be obtained.

A special booklet on shovel equipment is available on request. Ask our local office for Booklet B-2133, or write Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. Address Dept. 7-N.

Westinghouse

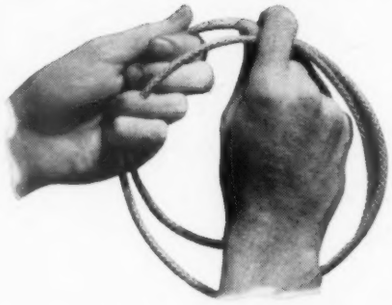
ELECTRICAL PARTNER OF THE MINING INDUSTRY

W
WESTINGHOUSE ELECTRIC



PRIMACORD

. . . the instantaneous detonating fuse for large and small blasts



Makers of Ensign-Bickford Safety Fuse since 1836

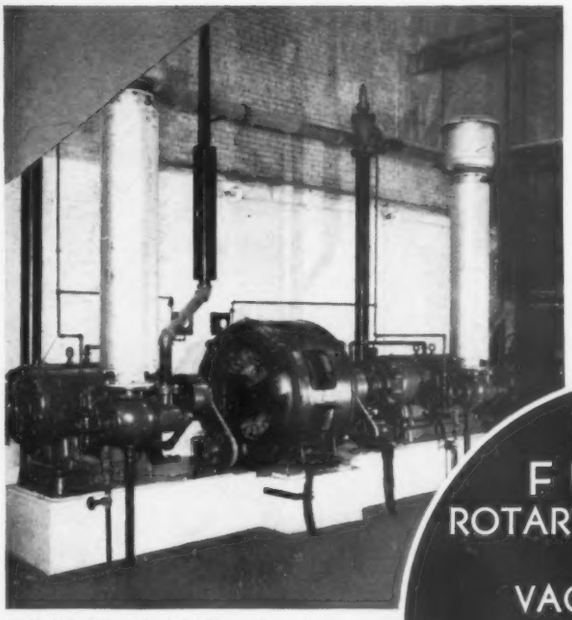
Whatever the size or type of blast, Primacord can be used with profit and increased safety. This insensitive fuse acts as the detonating agent in every hole, eliminating the use of caps in each load, and also connects all holes. It is practically instantaneous, yet permits desirable relief of burden. Strong, flexible and light in weight, it is easy to handle and profitable to use.

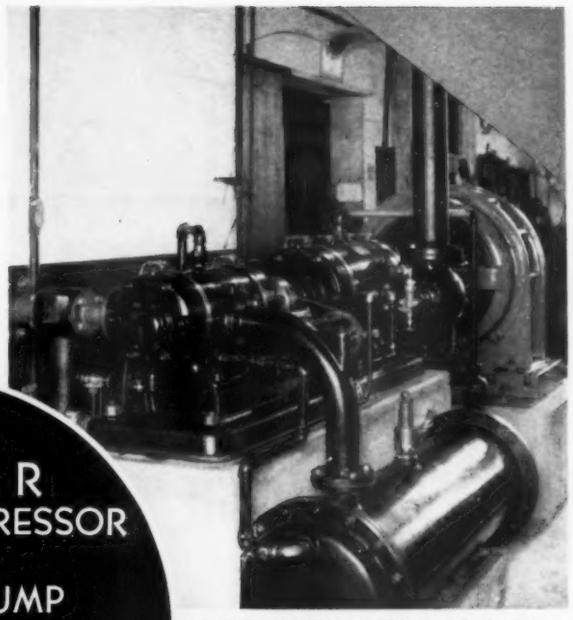
Write for the useful Primacord-Bickford book.

THE ENSIGN-BICKFORD CO. • SIMSBURY, CONN., U. S. A.

PRIMACORD·BICKFORD *Detonating Fuse*

PB 12



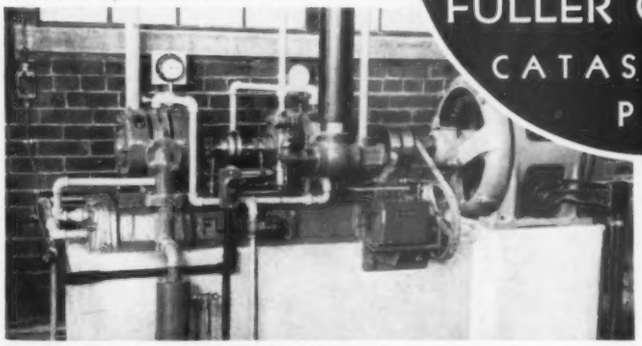


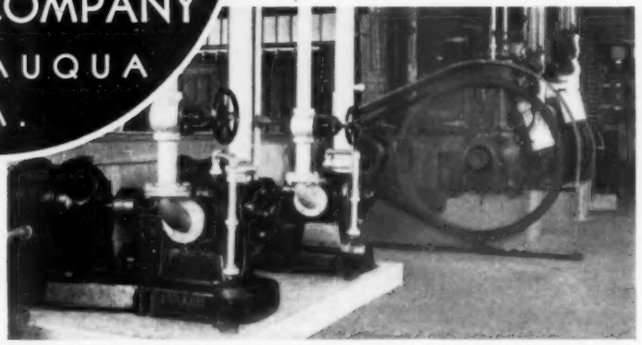
TYPICAL
FULLER
ROTARY COMPRESSOR
AND
VACUUM PUMP
APPLICATIONS

FULLER COMPANY
CATASAUQUA
PA.

CEMENT PLANT — Single-stage, duplex unit, common motor drive, capacity better than 2200 c.f.m. up to 30 Lb. pressure.

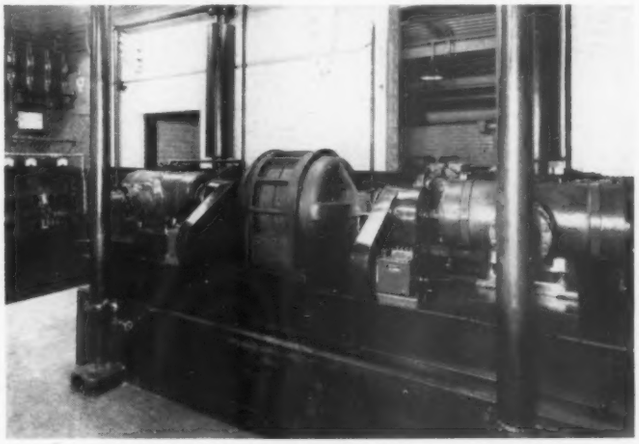
AUTOMOBILE TIRE PLANT — Two-stage Compressor, capacity 388 c.f.m. actual free air delivery, 110 Lb. pressure.

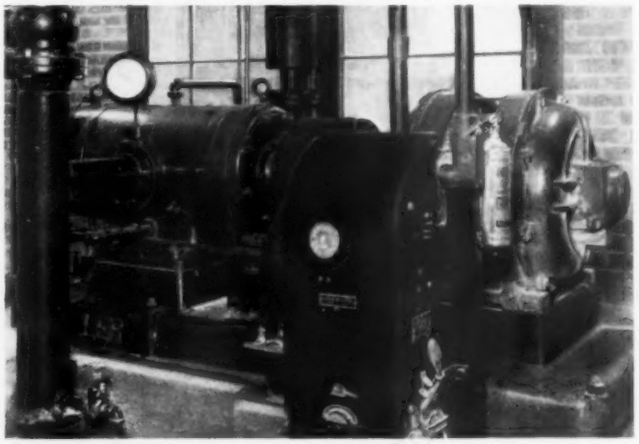




PATENT FASTENER PLANT — Two-stage Compressor, capacity 100 c.f.m. actual free air delivery, 90 Lb. pressure.

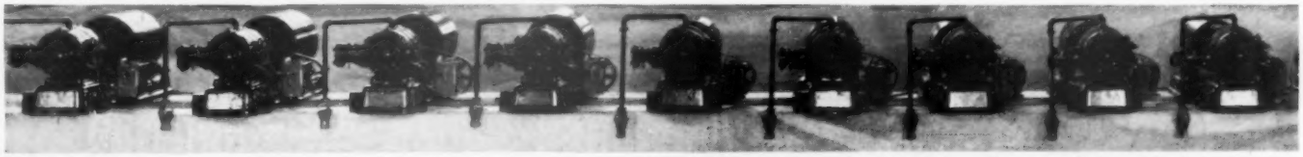
ICE PLANT — Two Single-stage Compressors, capacity each 100 c.f.m. actual free air delivery, 17 Lb. pressure.



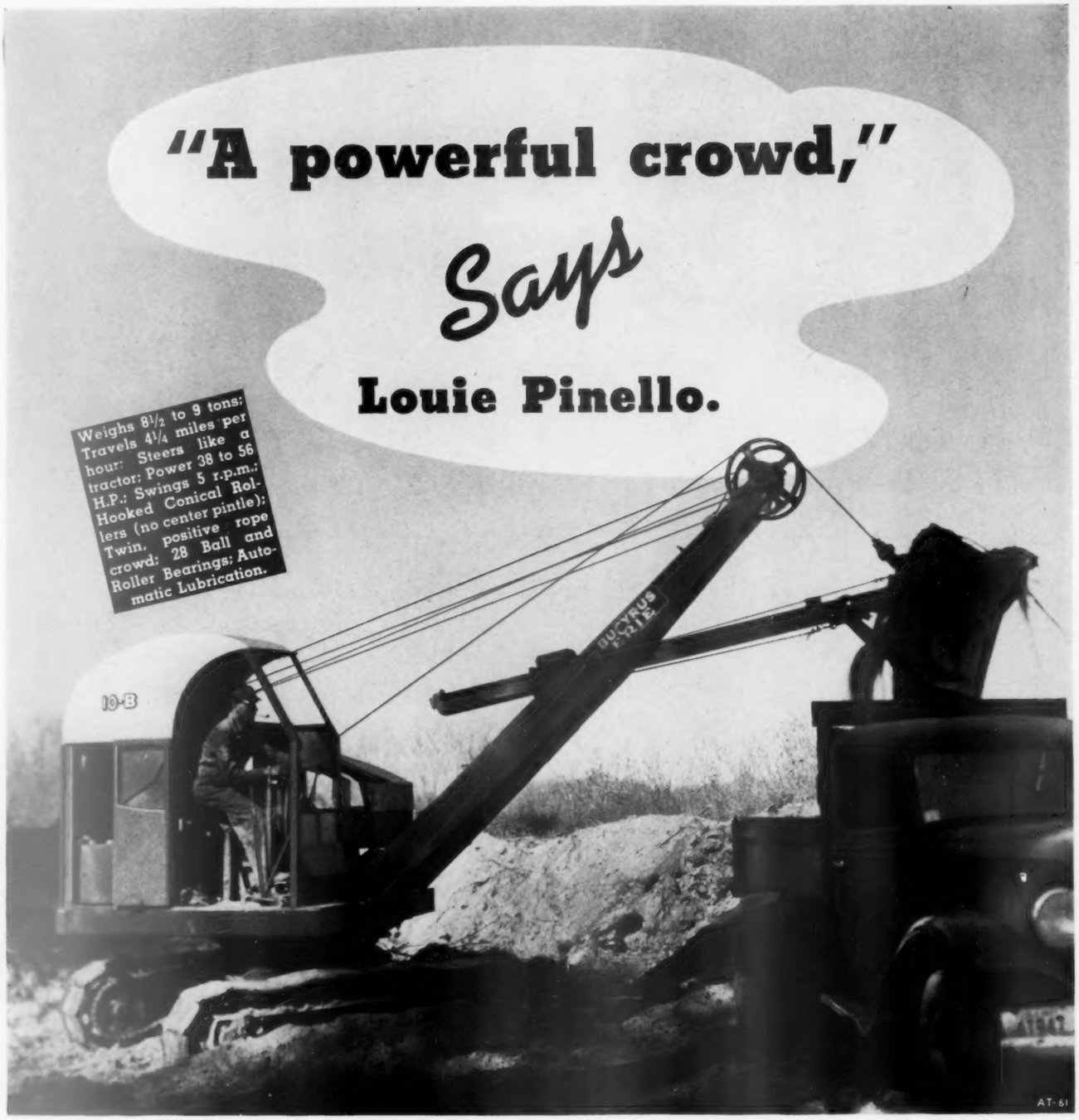


GAS & FUEL PLANT — Single-stage, duplex unit, common motor drive, capacity 750 c.f.m. actual free air delivery, 37 Lb. pressure.

GAS & FUEL PLANT — Single-stage Vacuum Pump, capacity 500 c.f.m. at 25 inches of vacuum.



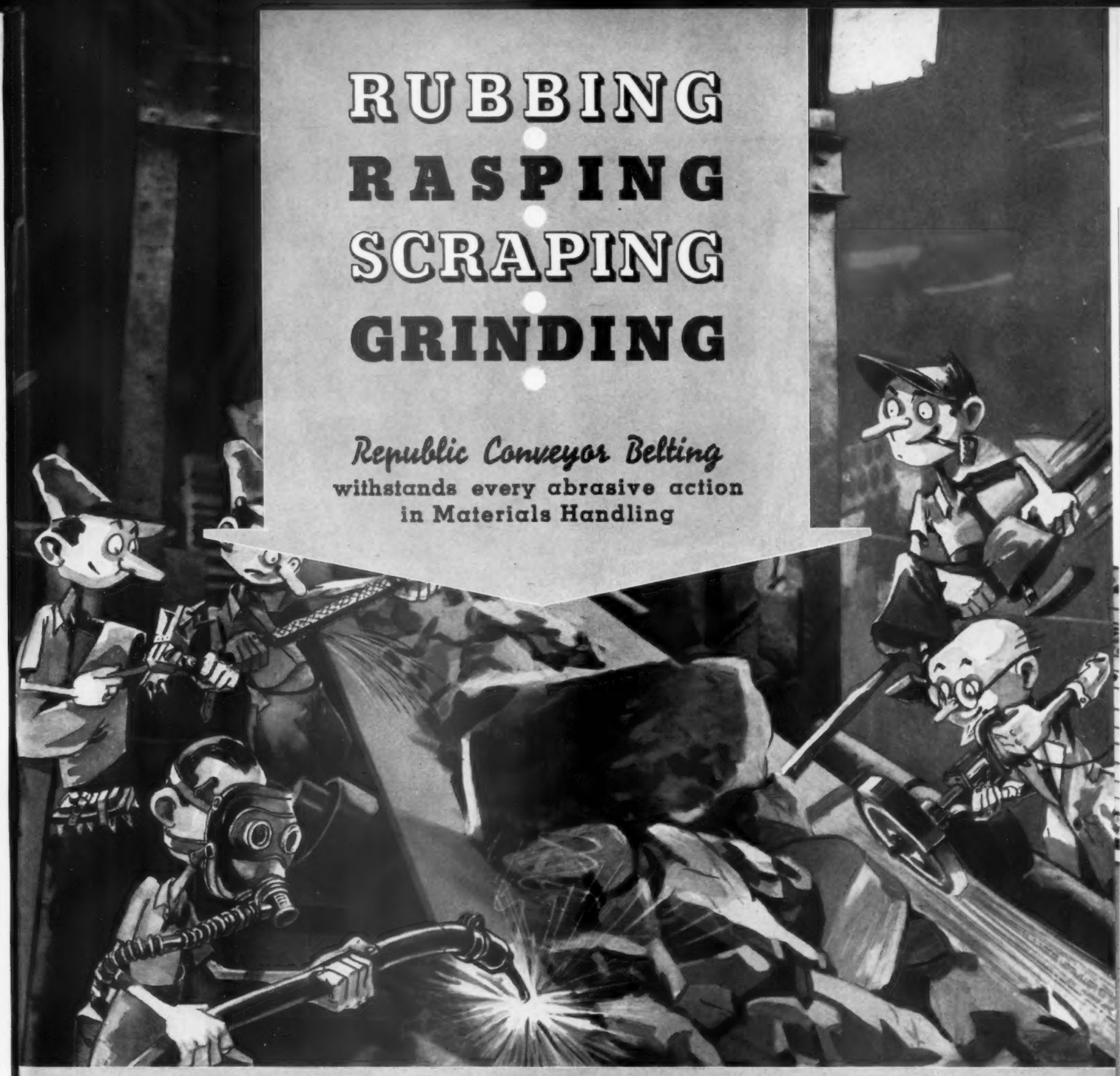
Nine of a shipment of twelve Single-stage compressors installed in United States Post Office Building, Washington, D.C., for use in connection with sewage ejectors. C-38


"A powerful crowd,"
Says
Louie Pinello.
Weighs 8½ to 9 tons; Travels 4¼ miles per hour: Steers like a tractor; Power 38 to 56 H.P.; Swings 5 r.p.m.; Hooked Conical Rollers (no center pintle); Twin, positive rope crowd; 28 Ball and Roller Bearings; Automatic Lubrication.
10-B
BUCYRUS ERIE
AT-61

And Louie should know for he's used his 10-B to load out 810 cubic yards (bank measure) of coarse gravel per 10 hour shift, for 61 shifts. You can't do that with a ⅜-yard unless you have plenty of "umph" behind the sticks. The 10-B crowd, most successful ever built into any excavator, has what-it-takes . . . a powerful, positive twin-rope crowd independent all other functions . . . simple, smooth, quiet, shock absorbing, fast in action, accurately controlled, and practically eliminating high-priced crowd maintenance.

Bucyrus-Erie

SOUTH MILWAUKEE WISCONSIN



RUBBING
RASPING
SCRAPING
GRINDING

Republic Conveyor Belting
withstands every abrasive action in Materials Handling

● Beneath the steadily moving loads of coarse, lumpy materials being transported by belt in countless industrial regions every day there is often a slight lurching . . . a perceptible shifting of load as the belt passes over troughing idlers . . . destructive abrasion. This enemy of Conveyor Belting is characteristic . . . unavoidable . . . with the handling of rocks, ore, coal and other lump products. The only way its costly action can be combatted is through belting designed to stand up under those conditions.

Republic Conveyor Belting is an excellent example of how successfully this severe type of wear can be controlled—with a structure mechanically and physically equipped for hard service over great periods of time, in spite of excessive abrasion. The rubber compound developed for the sturdy, heavy cover has abundant life and tenacity to resist rough frictional wear as well as impact and cutting at the loading point. Duck construction and rubber compound between plies supply essential properties for completely balanced serviceability.

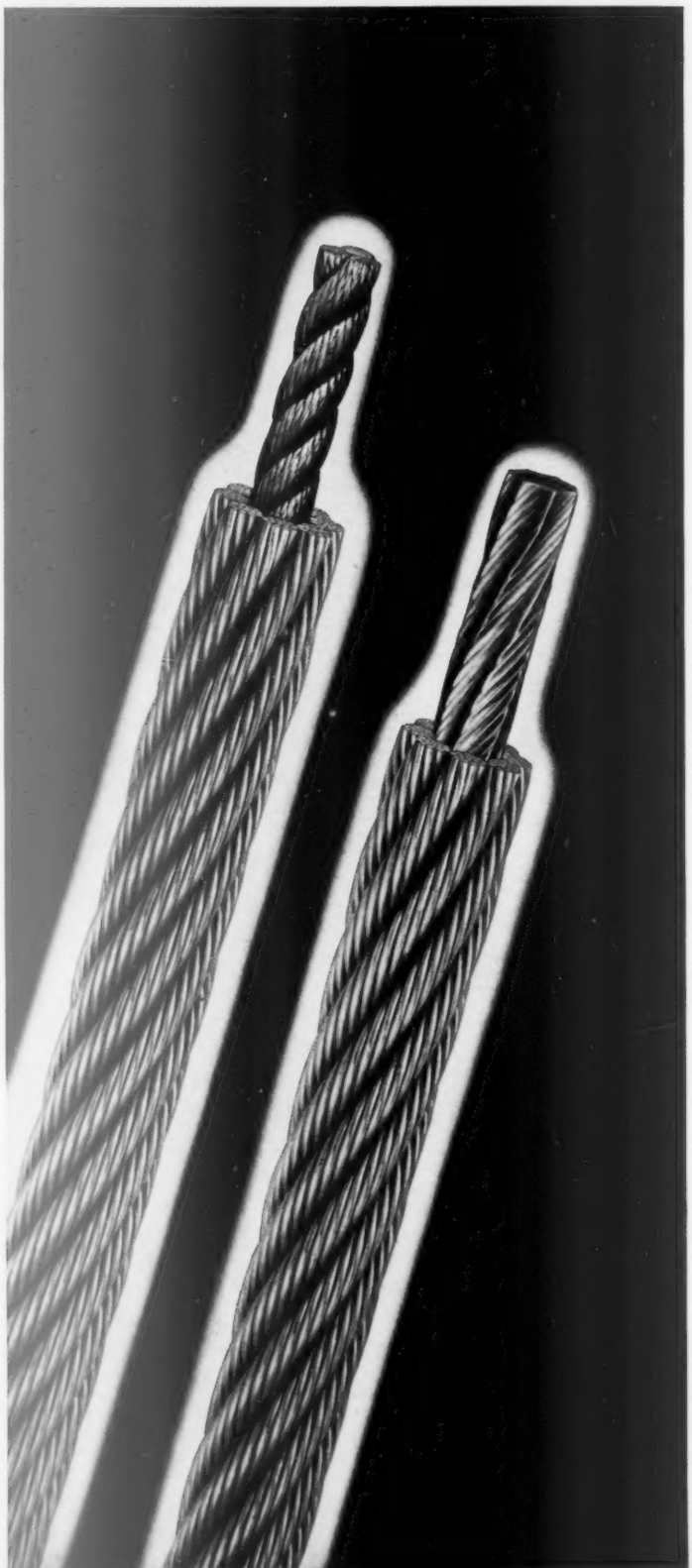
The applied skill of Rubber Technologists and Engineers which has provided Republic Conveyor Belting with its superior service capacities is also utilized in the controlled manufacture of the many other Republic Mechanical Rubber Goods. Republic Rubber Division of Lee Rubber and Tire Corporation, Youngstown, Ohio. . . . . .

REPUBLIC RUBBER

HOSE
BELTING
PACKING
MOLDED PRODUCTS

PURPLE-STRAND *FORM-SET* WIRE ROPE

BETHLEHEM Specify FORM-SET PRE-FORMED ROPE



A choice of 2 centers

THE real importance of centers in wire rope is not universally recognized. Steel wires, made into strands, support loads and supply the strength. But these strands must be held apart so that they won't "lock," wear and grind as they wind on drums or run over sheaves. The center or core handles this highly important job and the life of a wire rope depends on its performance as much as on that of the steel. Bethlehem offers two types of centers: the standard hemp core and the independent wire-rope center.

Hemp. For years this hard, tough core of hemp or other fiber has been standard in many types of ropes. The core of Bethlehem wire rope is specially lubricated with a compound that keeps the fiber pliable and resistant to moisture. This type of core is widely used in lines where highest strength and resistance to crushing is not required.

IWRC. For heavy loads, nothing can take the place of an independent wire-rope center. It adds 10 per cent to the strength of the rope. It greatly increases resistance to crushing and distortion, both on the drum and over sheaves. While the rope is stiffer to handle, it is just as flexible under load and because of its resistance to crushing it receives. less damage in running over small sheaves than fiber-center rope. Bethlehem uses a specially designed wire rope as the center, an independent rope made just as carefully and with just as great precision as the wire rope itself. It carries its own specially compounded lubricant. In Form-Set line the center is also pre-formed. Strands are accurately fitted around the center to give full, adequate bearing surface. The cost is 15 per cent more.

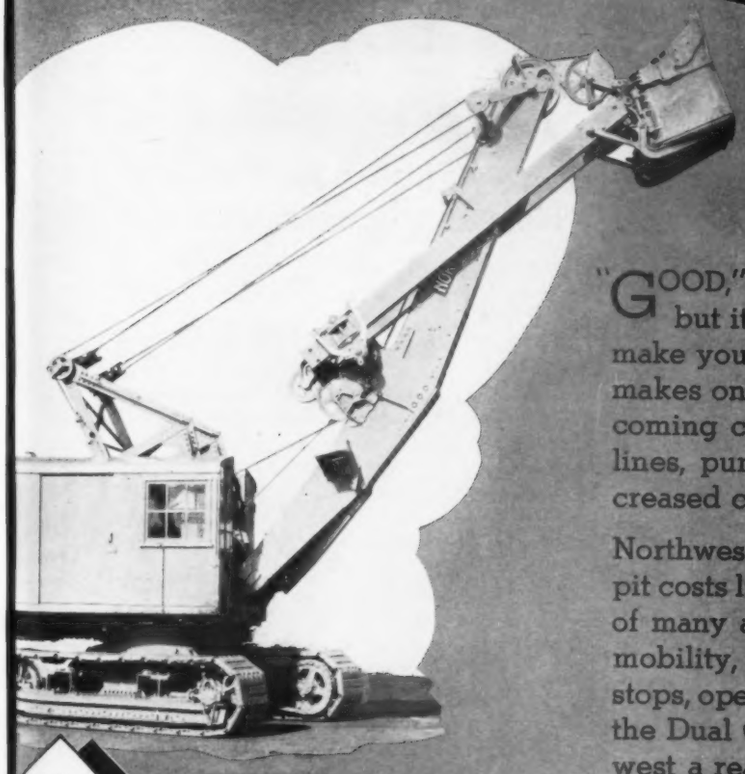
All Purple-Strand Form-Set wire rope is precision designed. Only the finest, premium-priced steels are used. Every step in the making of Purple-Strand is a result of half a century's study of wire-rope problems, three-quarters of a century's experience in making fine steel.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

VICE IN A MUSEUM *but*

HOW DOES IT LOOK ON THE BOOKS



Northwests are real rock shovels—proved in rock work — and economical in operation.

"GOOD," you say,—"good"—it doesn't owe us a dime." No, but it takes three men to operate it. Every move you make you lose time. It handles only a 3/4 yd. dipper and makes only 2 ½ passes a minute. Add to this all the shortcoming characteristics of steam—water compound, pipe lines, pumping water, ashes, boiler troubles and the increased cost of coal over gasoline, electricity or Diesel oil.

Northwests bring you features that mean a reduction of pit costs like these. A smaller Northwest will do the work of many an ancient giant—fast, one man operation, easy mobility, no water or steam troubles and when the engine stops, operating expense stops. And Northwest brings you the Dual Crowd and other advantages that make a Northwest a real rock shovel. Modernize your pit. There is no obligation in asking for information and there is a size for every pit.

Built in a range of 18 SIZES ½ yd. capacity and Larger

DUAL CROWD INDEPENDENT PLUS AUTOMATIC Digging Power Plus

NORTHWEST ENGINEERING COMPANY
1820 Steger Bldg. 28 E. Jackson Blvd. Chicago, Ill.

NORTHWEST

Readers and Advertisers Alike Prefer PIT AND QUARRY

For nearly a decade Pit and Quarry has led the field in subscriptions among producers. Its popularity has grown constantly, its margin of lead increased steadily, not by any sudden bound due to special offers or inducements. Its volume of advertising in 1938 was definitely larger than that of any other paper in the field.

The reason? At no time has Pit and Quarry compromised with its high editorial standards. It has held its editorial staff, and kept its field editor on the road, wearing out a car in one to two years. The illustrations have always been plentiful, the articles easy to read.

Costly to do this? Yes, it is. But it has been worth the cost, for producers realize that Pit and Quarry has worked with them. And the high percentage of subscribers who renew their subscription attests their loyalty to a publication understanding their problems and working with them.

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Return This Coupon To-day—Start Your Subscription with the September issue

.....

PIT AND QUARRY PUBLICATIONS,
538 So. Clark Street, Chicago, Illinois.

Enclosed find remittance for which enter my subscription to Pit and Quarry for.....
1 year ($1.00) .....starting with the September issue. (Foreign add $1.00 per year.)

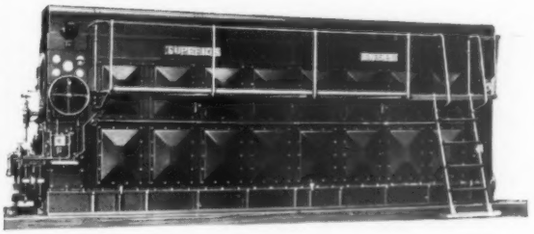
My Name..... Title.....

Company Name .....

Send to (Address).....

We Produce.....

The American Aggregates Corporation's dredge "AMERICA" and its sister dredge "COLUMBUS" are both powered by 810 H. P. Superior Diesels.



This Model Superior Diesel powers many dredges, driving generators or direct-connected to dredge pumps.

THE two Superior Diesels powering the American Aggregates Corporation's two large dredges are a real success!

In fact, Mr. Grant of that well-known Company has only the most enthusiastic praise for their faithful and low-cost performance. Mr. Grant knew when he purchased these engines in 1933 that they would be given years of hard service—24 hours per day, six days per week, at full load most of the time.

As an example, both dredges worked a total of 11,411 hours in 1938, at full load over 84% of the time.

The "America" worked a total of 8594.55 hours during 1938 and 1937, under full load 6863 hours, with a negligible record of engine delays. In 1938, this dredge operated 6144 hours, 5192 of which was under full load. Time lost for service to this engine during this period was less than one day.

Superior DIESELS

HEAVY DUTY MODELS: 50 to 810 H. P., 250 to 720 R. P. M.

HIGH SPEED MODELS: 15 to 230 H. P., 900 to 1800 R. P. M.

THE NATIONAL SUPPLY COMPANY . . . SUPERIOR ENGINE DIVISION

FACTORIES: Springfield, Ohio; Philadelphia, Pa. · SALES OFFICES: Springfield, Ohio; Philadelphia, Pa.; New York, N. Y.; Los Angeles, Calif.; Houston, Texas.

NOW STANDARD E
LeTOURNEAU M

The U-20 LeTourneau Carryall depends upon 1/2" and 5/8" "Flex-Set" Preformed Yellow Strand cables, with wire rope centers, for the economical operation of its famous "cable control."

A 1/2" "Flex-Set" Preformed Yellow Strand cable, with wire rope center, handles the blade of the LeTourneau Angledozer.

The "cable control" of LeTourneau Bulldozers is 1/2" "Flex-Set" Preformed Yellow Strand with wire rope center.

1/2" "Flex-Set" Preformed Yellow Stran keeps the LeTourneau Rooter under perf control.

EQUIPMENT ON ALL MACHINES

"FLEX-SET" PREFORMED YELLOW STRAND

After the most thorough tests and many careful field observations, R. G. LeTourneau, Inc., determined to supply "Flex-Set" Preformed Yellow Strand Wire Rope with every one of their famous "cable controlled" machines leaving the factory.

Thus the greatest economy in operation is assured right from the start: for "Flex-Set" Preformed Yellow Strand is made of "improved" plow steel of highest quality, drawn to our own exacting specifications—and 63 years' experience making nothing but wire rope has taught us what these specifications should be.

Preforming makes the rope limp and tractable—easy to handle and install—highly resistant to kinking—amazingly durable.

Maintain the economical operation of your LeTourneau equipment by replacing worn cables with "Flex-Set" Preformed Yellow Strand.

Distributors In All Industrial Centers

BRODERICK & BASCOM ROPE CO., St. Louis

Factories: **St. Louis, Seattle, Peoria** ***Branches:*** **New York, Chicago, Seattle, Portland, Houston**

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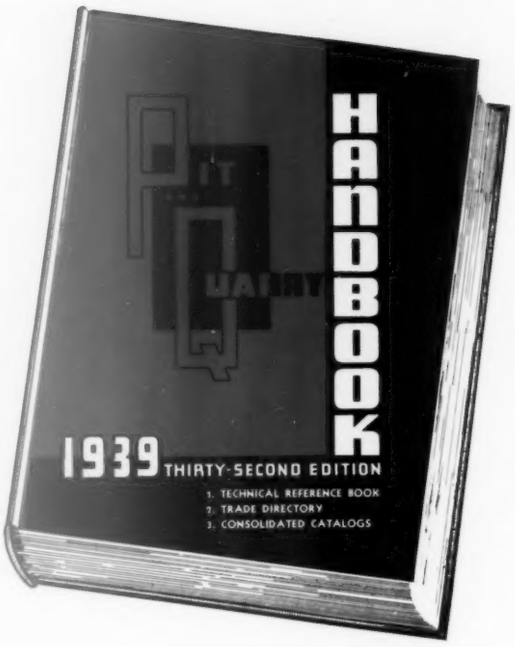

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. . . . *Alphabetical*, by Company Names ⟶

National Portland Cement Co. PC
420 Bourse Bldg., Philadel[illegible] a, Pa.
W. M. Richard[illegible] B. Franks (Bethlehem [illegible] gen. mgr.; Geor[illegible], John Shibe, tr[illegible]bethlehem, Pa.), gen. su[illegible] ch[illegible]achtmann (Bethlehem, Pa.),
Plant: Brodhead, Pa.

ALPHABETICAL

. . . . *Geographical*, by Plant Location ⟶

BRODHEAD Northampton
(P. O. Bethlehem.)
National Portland Cement Co. PC
Branch of Philadelphia, Pa.
Plant Executives: H [illegible]vendel, supt.; A. P. Hachtmann[illegible]; Franks, v.-pres., gen[illegible]ipment.
Pro[illegible]apacity: Portland cei[illegible]
Na[illegible] Deposit: Limestone. Stripping: Shovel. Drilling and Blasting: Blast hole drills. Digging and Loading: 2 P. & H. 2-cu. yd. electric shovels. Delivery to

GEOGRAPHICAL

Hundreds of New Names . . . Others Checked and Revised

The 1939 Directory section of Pit and Quarry HANDBOOK is the most complete ever published. It is up to the minute—as modern as skill and money can make it. It's checked and double checked. Copies are now available.

It gives you the names of the companies, their officers, the number and locations of plants, their capacities and equipment, and the names of the men who buy.

The technical section gives the latest production methods and practices. And there are consolidated catalogs of equipment.

The new and 32nd edition will be of greatest benefit to those who order promptly and receive their copy immediately. Use coupon below. Select either the complete Handbook and Directory, or the convenient Directory alone in smaller, flexible binding, more convenient for salesmen. The price is the same in either case.

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538 S. Clark St., Chicago, Ill.

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Please send.....copies of the 1939 DIRECTORY ($10.00 per copy) ☐ Send Invoice with book

Name ..... Title.....

Company .....

Town ..... State .....

"Washing twice as much gravel as before"..

LOADING 6 loose yards each bite

HAULING 540 feet to the hopper

DUMPING 72 loose yards hourly

. . . says Peoria Concrete Construction Company's pit operator. That in itself would justify modernization of their East Peoria, Illinois, plant. They've combined loading, hauling and dumping into one operation with the LeTourneau Carryall Scraper method. Chief advantage over former drag line systems is Carryall flexibility . . . to bring gravel to the hopper from anywhere in the pit.

But doubled plant production by no means completes the picture of profitable operation . . .

One LOW-COST-PER HOUR OPERATION...

takes care of initial overburden removal, too. It's no trick to alternate between actual aggregates production and stripping this Carryall way! With 8 to 15 feet of clay topsoil to be removed from the 20-acre area, the operator has preplanned stripping for constant down-hill loading . . . that gives him capacity loads in the shortest possible time. It's the right way to take fullest advantage of the Carryall savings! At the same time, overburden is being wasted into worked-out sections, leaving the site in its original useable form for profitable resale.

Behind Peoria Concrete Construction's choice of a LeTourneau Carryall for the work lies a recommendation for you. It's the only equipment to cut overhead on every operation between the pit and the hopper! Your LeTourneau and "Caterpillar" dealer will say it with a demonstration. R. G. LeTOURNEAU, INC., Peoria, Illinois, Stockton, California.

CARRYALL* SCRAPERS, ANGLE-DOZERS*, BULLDOZERS, ROOTERS*, POWER CONTROL UNITS, DRAG SCRAPERS, PUSHDOZERS, SHEEP'S FOOT ROLLERS, CRANES, TREE-DOZERS. *Name Reg. U. S. Pat. Off.

LETOURNEAU

Stripping EQUIPMENT

HOW MULTICLONE DUST COLLECTORS SAVE YOU MONEY

Multiclones are the original small tube cyclonic dust collectors. Present installations handle from a few c.f.m. to 200,000 c.f.m. and over. For a given power input, Multiclones have a higher collection efficiency than any other dry cyclonic collector. They are all-metal, fireproof, handle gases at all practical temperatures and minimize the explosion hazard by dividing the gas stream into many small volumes. They are compact, occupy small floor space and headroom and can often be located in space that can be used for no other purpose. No moving parts, nothing to clean, repair or replace. Tube section can be jacketed for recovery of heat. The Multiclone shown here is recovering dust from sand and stone dryer in hot asphalt plant. The 16 tubes are approximately ten times as efficient as a single cyclone of the same overall size. Operated under suction, the fan is protected from the dust. Collection efficiency based on total solids can be as high as 99 percent. Multiclones are used in all industries where fine particles must be collected to eliminate a nuisance or for the recovery of by-products or powders resulting from process operations. For still more efficient performance, write for facts about Cottrell Electrical Precipitators.

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WESTERN PRECIPITATION CORPORATION
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405 LEXINGTON AVE., NEW YORK, N.Y.

NOV 13 1939

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PIT AND QUARRY

Vol. 32 September, 1939 No. 3

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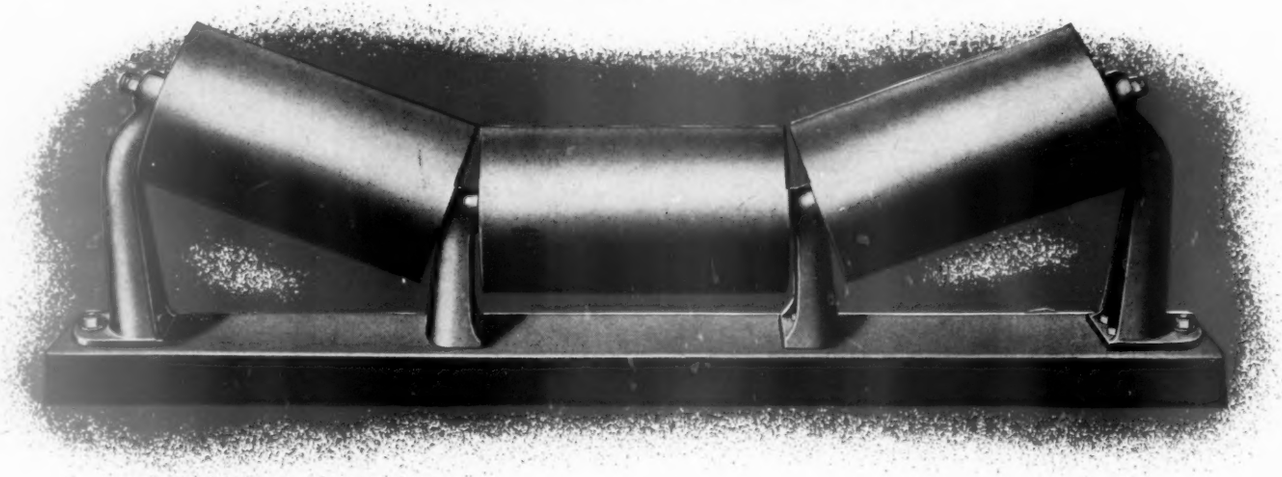

● Rigid Truss Construction (Non-Demountable Pulleys) — Streamlined malleable iron brackets of crescent section giving greatest strength, bolted to strong channel base with heavy bolts and automatic lock nuts—Machined bracket hubs for solid anchorage of shafts at both ends—Base, brackets, and shafts form solid, vibration-proof truss—Timken equipped steel or cast iron pulleys of ample load-carrying capacity — Interchangeable unit pulley assemblies with Timken races backed against heavy adjustable shaft shoulders with positive lock.

● ● Thorough Lubrication through Robins Patented Single-Shot System maintained indefinitely by new improved triple seals. Six seals per idler, each combining the leak-proof check-valve feature essential to single shot lubrication with felt-labyrinth-cork combination for super-protection against dirt or water.

● ● ● True and Accurately Balanced Pulleys with close gap between them ($1/4''$) insure minimum rolling friction and avoid creasing of belts — Streamlined bracket design avoids lodging of material between bracket and pulleys, insuring pulley rotation under all conditions.

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Ralph E. McLean, 63, Dies After Stroke

PROMINENT IN STONE INDUSTRY

Ralph E. McLean, 63, president of the East St. Louis Stone Co., East St. Louis, Ill., died of a paralytic stroke Sunday, July 23. A native of East St. Louis, he went to work for the company he headed as a clerk shortly after the turn of the century, advancing to secretary, later to general manager, and finally, president.

Because of his interest in the city of East St. Louis, Mr. McLean created for the police department a pistol range on

Ralph E. McLean

property he controlled near Falling Springs. He provided necessary equipment, furnished the labor required in constructing the range, and refused to take any compensation for his efforts.

He is survived by his widow, a son, Morris, and a brother, N. C. McLean.

Flames Cause $100,000 Cement-Plant Damage

Within a scant 90 minutes on August 9, roaring flames engulfed the mill room of the Southern Cement Co. at Birmingham, Ala., doing damage estimated by company officials at more than $100,000. Stored in the mill room were paper bags, 1,000 barrels of cement and hydraulic lime in addition to considerable processing and packing machinery, according to George C. Walter, vice-president and general manager.

McElwee & Rogy Open Another Gravel Plant

A new sand-and-gravel plant, under construction near Chillicothe, Ill., by McElwee & Rogy, Inc., of Peoria will be ready to operate about September 15.

The company purchased the 55-acre site on which the plant is located some time ago. It lies along the banks of the Illinois River. The new operation will have a capacity of about 600 tons per day.

Phosphate Production Up, Shipments Lower

Midyear reports show an increase of 3 per cent. in the quantity of phosphate rock mined in the United States, but a decline of 6 per cent. in the quantity shipped.

The total quantity of phosphate rock sold or used in the United States, as compiled from reports by producing companies to the Bureau of Mines, was 1,750,114 long tons valued at $6,086,726 during the half year ended June 30, 1939, compared with 1,860,787 tons valued at $6,740,616 shipped during the similar period in 1938.

Stocks in producers' hands increased. Over a million and a half tons were held in Florida on June 30, 1939, over 7 months supply at current rates of shipment of Florida rock.

Western Works Acquired by Bluff City Lime Co.

The Western Lime Works of Ste. Genevieve, Mo., has been purchased by the Bluff City Lime Co., a subsidiary of the Mississippi Lime & Cement Co., of Alton, Ill.

The Bluff City company is now installing a third rotary kiln at a reported cost of $200,000.

Rush Construction of Newest Cement Plant

EQUIPMENT CONTRACTS CLOSED

By daylight and under floodlights at night a crew of 400 workmen are busy near Los Altos, Cal., erecting the new $4,000,000 cement plant of the Permanente Cement Corp. of San Francisco.

It is expected that operations will be started shortly after the first of the year.

Awarded a 5,800,000-bbl. contract by the Federal government to supply the needs of Shasta Dam, the corporation must begin making deliveries at the rate of 7,000 bbl. daily by March 1, 1940.

The new plant will use froth flotation, under the Breerwood Process, in the preparation of its raw-material mixtures, enabling it to produce cements meeting the government specification for Shasta Dam, as well as ordinary and special types of Portland cements, under uniform control of chemical composition. The Permanente Corp. is doing its own general design of the entire plant. The contract for the design and equipment for the raw-material processing plant was closed with the Separation Process Co. of Catasauqua, Pa. The raw-material departments were designed to take full advantage of the process with respect both to accuracy in the chemical control of composition and savings in production, particularly in quarrying and grinding.

Hold Safety Meetings Not "Working Time"

Time voluntarily spent in attending safety meetings after working hours and as part of a general safety program sponsored or approved by a governmental agency such as the Bureau of Mines, or by a recognized independent organization engaged primarily in safety-information dissemination, will not, as a general rule, be considered as working time under the Fair Labor Standards Act, Administrator Elmer F. Andrews of the Wage and Hour Division, U. S. Department of Labor, has announced.

White-Cement Plant Nearing Completion

IN PRODUCTION THIS MONTH

A small plant for the manufacture of what the company terms "the whitest of all white cements" is nearing completion at Carrara, Nev., by the recently-formed Carneva Portland Cement Co. Production is scheduled to start in September.

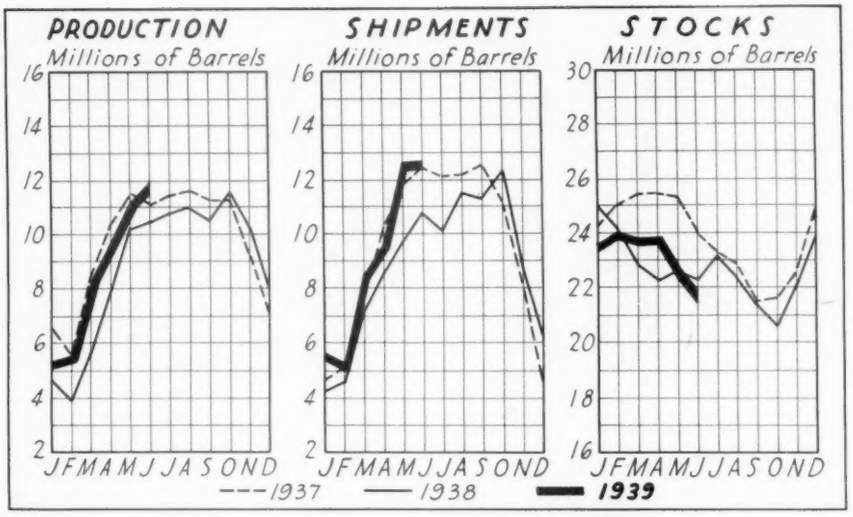
The raw materials are white marble limestone and white silica-aluminum clay of which the company owns 600 acres adjoining the plant. Years ago the deposit was operated for dimension stone and statuary materials.

The new operation is merely a pilot plant, designed to test out the raw materials on a commercial basis in order to determine methods to be used when a large plant is erected. As soon as the pilot plant is operating, officials expect to go ahead with detailed plans for an initial 1,000-bbl. unit, so designed that other units can be added when needed at a minimum of expense.

Harry E. Mick, president and general manager, was formerly assistant operating manager of the Coplay Cement Mfg. Co., Coplay, Pa. Edward L. McInally is vice-president, Albert A. Hall is secretary-treasurer and W. L. Pierce is plant superintendent. O. L. McCain is in charge of chemical work.

According to Mr. Mick, with most of the white cement now being manufactured in the east, there is an excellent market for the product in California and the western states. The port of Los Angeles is but 350 miles distant over paved roads, giving the concern a promising outlook for exports.

Old white-marble quarry which will provide raw material for the new plant.



The Portland-cement industry in June, 1939, produced 11,953,000 bbl., shipped 12,715,000 bbl. from the mills, and had in stock at the end of the month 21,489,000 bbl., according to the Bureau of Mines. Production and shipments in June, 1939, showed increases of 13.5 and 16.2 per cent., respectively, as compared with June, 1938. Portland-cement stocks at mills were 4.4 per cent. lower than a year ago.

RECENT GOVERNMENT CONTRACTS FOR MATERIALS UNDER THE PUBLIC CONTRACTS (WALSH-HEALY) ACT

Date of Delivery 1939	Source of Supply	Government Agency	Commodity	Amount
Indef.	Whitehall Cement Mfg. Co. ,Cementon, Pa.	W. P. A.	Portland cement	$11,300.00
9/30	Lone Star Cement Corp., Bonner Springs, Kan.	W. P. A.	Portland cement	20,518.40
12/31	Medusa Portland Cement Co., York, Pa.	D. C. Govt.	Portland cement	12,525.00
12/31	Standard Lime & Stone Co., Martinsburg, W. Va.	D. C. Govt.	Portland cement	30,000.00
Indef.	Santa Cruz Portland Cement Co., San Francisco, Calif.	Procurement	Portland cement	Indefinite
Indef.	Blue Diamond Corp., Ltd., Los Angeles, Cal.	W. P. A.	Portland cement	14,794.82
6/30/40	Basalt Rock Co., Inc., Napa, Cal.	Navy Purch. Off.	Concrete	175,085.00
6/30/40	Super Concrete Corp., Washington, D.C.	Wash. Navy Yd.	Transit-mixed conc.	35,987.50
12/31	Gray Concrete Pipe Co., Arlington, Va.	Procurement	Concrete pipe	Indefinite
12/31	Helms Concrete Pipe Co., Inc., Alexandria, Va.	Procurement	Concrete pipe	Indefinite
10/31	Worrell & Huston, Hope, Ind.	Agriculture	Agricultural Limestone	Indefinite
12/31	Massaponax Sand & Gravel Corp., Wash., D.C.	D. C. Gov.	Sand and Gravel	12,475.00
12/31	Contee Sand & Gravel Co., Inc., Laurel, Md.	D. C. Gov.	Sand and Gravel	Indefinite
5/5	The Cleveland Slag Co., Cleveland, O.	W. P. A.	Slag	13,545.70
12/31	The Maryland Slag Co., Sparrows Point, Md.	D. C. Gov.	Slag	45,450.00
5/15	Great Lakes Steel Corp., Detroit, Mich.	W. P. A.	Crushed slag	16,500.00
9/19	Standard Bitulithic Co., New York, N. Y.	W. P. A.	Bituminous mixture	12,228.72
9/30	Schwartz Supply Co., Inc., New Orleans, La.	W. P. A.	Cement	35,640.00
9/30	Geo. Kellett & Sons Inc., New Orleans, La.	W. P. A.	Cement	10,000.00
8/21	Richmond Sand & Gravel Corp., Richmond, Va.	Treasury, USCG	Cement	10,221.40
9/1	Whitehall Cement Mfg. Co., Cementon, Pa.	W. P. A.	Cement	13,944.69
12/31	Ready-Mix Concrete Co., Ltd., Honolulu	Pearl Harbor Navy Yd.	Ready-mixed concrete	39,375.00
11/1	Mid Atlantic Concrete Pipe & Products Corp., Norfolk, Va.	Treasury, USCG	Concrete pipe	33,874.70
4/18	Cleveland Slag Co., Youngstown, O.	W. P. A.	Slag screenings	11,100.00
4/30	Inland Lime & Stone Co., Detroit, Mich.	W. P. A	Crushed stone	23,000.00
9/30	J. Watts Kearny & Sons, New Orleans, La.	W. P. A.	Gravel	33,440.00
9/30	Jahncke Service, Inc., New Orleans, La.	W. P. A.	Concrete sand	13,200.00

New Aggregates Plant for Santee-Cooper Dam

A $75,000 aggregates plant is being erected in the town of Lugoff, S. C., by the Becker County Sand & Gravel Co. of Crosby, Minn., to serve the Santee-Cooper dam project.

From this plant, the Becker company, with the William M. Byrd company of Charleston, S. C., as its sales representative, will supply the Santee-Cooper project with 225,000 cu.yd. of washed gravel and 140.000 cu.yd. of washed sand for concrete work.

In addition to furnishing gravel and sand to the big dam job, the company expects to handle commercial accounts in the mid-South.

Two miles of spur track are being laid from near the Seaboard R. R. station at Lugoff to the plant. Milton C. Evans is superintendent in charge of the plant.

The plant will on September 15 be in full operation and will turn out 25 carloads of washed gravel and sand daily.

Carney Co. to Enter Mineral-Wool Field

BUILDS PLANT IN MINNESOTA

C. V. McKinney, formerly connected with the Norge Corp., will serve as plant superintendent and company engineer for the new mineral-wool plant of the Carney Rock Wool Co., affiliated with the Carney Cement Co., Mankato, Minn.

Construction of the insulation plant, which will be located near the Carney company quarries, just north of Mankato, will be begun shortly, according to company officials.

Mr. McKinney will serve as construction superintendent during the building of the factory.

The new company will have available, from the Carney quarries, a huge natural supply of wool rock.

When in operation the new plant will offer delivery service through a fleet of trucks that will carry Carney cement and rock wool to Minnesota, Wisconsin, Iowa, the Dakotas, Montana and Nebraska.

Universal Atlas Opens Another Packing Plant

Business and civic leaders of southern Michigan attended the informal open-house program on August 15, of the new Muskegon, Mich. storage-and-packing plant of the Universal Atlas Cement Co.

The plant consists of five storage tanks built of concrete with cone bottoms. The packing room and sack building are steel frame covered with corrugated cement-asbestos roofing and siding.

Cement is shipped in bulk from the Buffington, Ind. plant of the company in the motorship "Steel Chemist" and unloaded by a special Fuller-Kinyon, high-capacity portable unloader. From the storage tanks cement is loaded in bulk or in bags to cars or trucks for delivery to market.

The plant is located at The Mart, Muskegon, one of the largest and most active commercial docks and progressive distributing conters on Lake Michigan.

Consolidated Employees Have Newsy Magazine

A chatty little house-organ is issued once a month by the Consolidated Rock Products Co., Los Angeles, Cal., solely for and about its employees.

Called *Consolidated Rock News,* its 16 pages are brimful of personal items, a safety page, a monthly report of the employees' credit union, and two or three pages of sports covering softball, bowling and other sports events among company teams. But the most space, by far, is devoted to short, and usually humorous items about the men and women who work for the company. Here are a couple of gems from the most recent issue:

"Says Joe Newlan: I'm after a plant superintendency and begging the consideration of all. I'm figuring on a plant that produces nothing by CR4 and gravel 3; where concrete sand is unknown; where production costs never go over .022; where no water ever drips down on the new trucks; with flexible rubber screens that change material sizes faster than a salesman does his mind."

"Sport Item: Our Consolidated ball club had a twilight practice game down in Skagg's cow pasture. Practice was called off in the second inning when Everett Jumper slid into what he thought was second base."

Nonmetallic Minerals in Pennsylvania Sketched

Because the Geological Survey of Pennsylvania receives many inquiries as to the presence of minerals in Pennsylvania, which cannot be answered by reference to readily accessible literature, Dr. R. W. Stone set himself to the task of searching official and other publications and field investigations for data for miniature sketches on Pennsylvania minerals. These thumb-nail sketches are contained in a recent report by Dr. Stone entitled *The Minerals of Pennsylvania—Nonmetallic Minerals.*

The minerals described include asbestos, barite, corundum, feldspar, garnet, graphite, magnesite, phosphate minerals, potash, quartz-flint, rock salt, titanium-rutile, vermiculite, and miscellaneous minerals such as allanite, beryl, cyanite, epidote, gems, greenockite, tourmaline, and uranium-bearing minerals.

Honduras May Have First Cement Plant

Plans are afoot for the establishment of a cement plant, the first of its kind, in Honduras. According to the Bureau of Mines, the Honduran Ministry of Fomento has approved a concession for the manufacture of cement. The concession is held by a nephew of the President and by a son of the Minister of Education, the raw materials to be taken from a deposit near Tegucigalpa owned by the former.

At present all cement used in Honduras is imported, chiefly from the United States and Germany.

Construction Volume Continues Upward

ALL CLASSES SHARE IN GAINS

The total dollar volume of construction contracts awarded in the 37 Eastern states during the first seven months of 1939 amounted to $1,999,247,000, which is 30 per cent. ahead of the same period last year, according to statistics compiled by the F. W. Dodge Corp.

Non-residential building, with a valuation of $88,501,000, for July, 1939 has shown a 22-per cent. increase over July of last year which is better than the 19-per cent. increase that existed at the end of the first half. Included in this non-residential figure for July is $17,404,000 for manufacturing buildings, which is 10-per cent. ahead of June this year and 80-per cent. above July of 1938.

The residential contracts awarded for July, while $2,566,000 or 2-per cent. below June, are 25-per cent. ahead of July last year. Considering just one-and-two-family houses, however, July equalled June of this year.

Statistics on Output of Slag Are Revealed

In 1938, according to the National Slag Assn., there were 34 companies operating a total of 70 plants engaged in preparing blast-furnace slag for the market. A total of 7,978,066 short tons of air-cooled and granulated slag valued at $6,246,615 was processed during 1938 for commercial uses such as road metal, building construction, railroad ballast, roofing aggregate, fill material, mineral wool, and agricultural products.

Of the total tonnage produced, 7,321,259 tons were air-cooled (screened and unscreened) slag, valued at $6,167,892 for principal uses as aggregate for concrete construction, road building, and railroad ballast. The average price range, according to extent and detail of processing necessary and use, ranged from $0.39 to $1.40, excluding the peak price given under the heading of miscellaneous which includes a number of special uses which were concealed to prevent disclosure of individual company data.

Granulated slag represented 656,807 tons valued at $43,731 with a peak value of $0.79 per ton for agricultural purposes, for which use special processing was necessary, to $0.08 per ton for fill material.

W. W. Lynch has joined the staff of the American Potash & Chemical Corporation at Trona, Calif., as assistant California manager.

1938 AGGREGATES OUTPUT DECLINES

Crushed Stone

The total output of crushed and broken stone in the United States in 1938, as reported to the Bureau of Mines by producers, amounted to 123,072,820 short tons valued at $117,476,884, a decrease of 6 per cent. in quantity and 4 per cent. in value compared with 1937. Included in this total is stone sold or used for concrete aggregates, railroad ballast, riprap, agricultural limestone, refractory stone, and stone for metallurgical use, alkali works, calcium-carbide works, sugar and glass factories, paper mills, and various other chemical and manufacturing processes. Stone used in the manufacture of lime or cement, asphaltic stone, or slate used for granules or flour is not included in this total.

Crushed or broken stone used for concrete aggregates and railroad ballast constituted 77 per cent. of the industry in 1938—94,763,050 short tons valued at $88,767,221. Nearly 40 per cent. of the concrete and road-making aggregates was produced by noncommercial operators (states, counties, municipalities, and other government agencies). Noncommercial production in 1938 increased 32 per cent. compared with 1937, whereas commercial output declined 3 per cent.

In 1938 about 60 per cent. of the commercial aggregates was transported by truck; 22 per cent. by railroad; 10 per cent. by water; and the remainder unspecified. Comparable figures for 1937 are as follows: Truck, 61 per cent.; railroad, 26 per cent.; water, 9 per cent.

Crushed stone for metallurgical purposes, which ranks next to concrete aggregates in quantity consumed, fell to an unusually low level in 1938, registering a decline of 55 per cent. compared with 1937. Limestone for agricultural use (4,367,410 short tons valued at $5,637,485) declined 13 per cent. in both quantity and value. Of the total, 423,640 short tons valued at $579,331 was noncommercial production by the Soil Conservation Service, W.P.A., state, county, and other governmental agencies. Refractory stone (ganister, mica schist, dolomite, and soapstone) amounting to 659,690 short tons valued at $991,765, dropped to less than half of the 1937 production (1,525,260 short tons valued at $4,258,900).

Limestone used for miscellaneous purposes declined from 8,636,070 short tons valued at $8,424,338 in 1937 to 6,780,400 short tons valued at $7,073,094 in 1938, or a decrease of 21 per cent. in quantity and 16 per cent. in value.

Sand and Gravel

Total United States production of sand and gravel decreased 4 per cent. in tonnage and 12 per cent. in value with an output of 181,320,233 short tons valued at $85,922,847 in 1938, compared with 189,660,423 tons valued at $97,472,997 in 1937. Contractors and construction or highway maintenance crews employed by Federal, state, county, or municipal governments accounted for two-fifths of the total output compared with one-third of the total in 1937. More than three-fifths of the material used on Federal projects was produced by W.P.A. crews.

Sales by commercial producers amounted to 105,759,786 short tons valued at $65,015,878 in 1938, a decrease of 16 per cent. in tonnage and 18 per cent. in value from 125,342,478 tons valued at $79,114,318 in 1937. Building sand decreased 12 per cent. with an output of 22,939,683 tons in 1938 and 26,050,459 tons in 1937. Paving sand dropped to 16,755,634 tons, a decrease of 4 per cent. from the 1937 figure of 17,395,013 tons.

Approximately 92,825,363 tons, amounting to 88 per cent. of the commercial output, were reported as washed or screened material, with an average value of 66 c. per ton compared with 29 c. for unprepared sand and gravel.

Accounting for approximately 86 per cent. of the commercial production, method of transportation was reported for 91,096,810 tons. Of that amount 43 per cent. was shipped by truck, 41 per cent. by rail, and 16 per cent. by waterway.

States leading in production in order named were: New York, California, Illinois, Ohio, and Michigan, compared with Illinois, New York, California, Ohio, and Washington in 1937.

With an increase of 17 per cent., sand and gravel produced by noncommercial operators in 1938 amounted to 75,560,447 short tons compared with 64,317,945 tons in 1937. Average value was 28 c. per ton. Washed, screened, or otherwise prepared material accounted for 18 per cent. of the total production. Construction and maintenance crews of states, counties, municipalities and other government agencies produced 44,745,693 tons valued at 21 c. per ton, while contractors working expressly for those agencies produced 30,814,754 tons valued at 37 c. per ton. Of the total output, state highway departments accounted for 51 per cent., counties 32 per cent., municipalities 3 per cent., and other agencies 14 per cent.

U. S. Publishes New Market Data Book

COVERS 280 INDUSTRIES

A new guidebook for American businessmen, the *Industrial Market Data Handbook,* containing vital information for establishing new sales territories, production quotas and marketing campaigns, is now available for distribution.

The handbook, first of its kind ever published, contains complete figures on industrial production, employment, value of products, cost of material, fuel and power, and output per wage earner for each of the 3,070 counties in the United States, and similar data for every city of more than 10,000 population. The figures in the handbook pertain to 1935, the latest year in which information in this form is available.

The study is especially designed to aid sales and advertising executives in estimating sizes and locations of their markets together with the potential value of these markets.

Included in the handbook is a tabulation of the county locations of 169,111 manufacturing plants by kinds of industry. Parallel tables covering the mining industry with a county location table for each of the 23,000 mines by type of mine are also in the handbook. Operation summaries showing the number of firms engaged, cost of material, fuel and power, value of products and the number of wage earners are included on a national basis for each of the 280 industries covered in the handbook.

The handbook was prepared as a cooperative study by the Bureau of Foreign and Domestic Commerce, the Census Bureau, and the Bureau of Mines.

Copies may be obtained from the Superintendent of Documents, Washington, D. C., or from any District Office of the Bureau of Foreign and Domestic Commerce located in principal centers of the United States. The price is $2.50 per copy.

Columbia Wins Award to Supply Dam Gravel

A $4,413,520 contract to furnish the aggregates for building Shasta Dam in California has been awarded the Columbia Construction Co. of Oakland, Cal.

The aggregates will be obtained from a deposit near Redding, Cal., where the Columbia company will erect its plant.

The contractor must begin deliveries by November 1 of this year and is allowed 2,000 days to complete the contract.

FTC Amends Charges Against Lime Makers

CLAIMS RECORDS DESTROYED

The Federal Trade Commission has amended its complaint issued in September, 1938, charging 20 producers of lime with fixing and maintaining, by combination and agreement, the prices at which their product is sold to customers in the southeastern states where all their plants are located. The amended complaint involves the use of basing point delivered prices.

The respondent producers and the places at which their plants are located are as follows:

Pine Hill Lime & Stone Co., Pine Hill, Ky.; Southern States Lime Corp., Crab Orchard, Tenn.; Gager Lime Manufacturing Co., Sherwood, Tenn.; Knoxville Lime Manufacturing Co., Knoxville, Tenn.; Longview-Saginaw Lime Works, Inc., Long View and Saginaw, Ala.; Cheney Lime & Cement Co., Landmark and Greystone, Ala.; Ladd Lime & Stone Co., Cartersville, Ga.; Virginia Lime Products Co., Inc., Eagle Rock, Va.; Kimbalton Lime Co., Inc., Shawsville, Va.; Eagle Rock Lime Co., Eagle Rock, Va.; Williams Lime Manufacturing Co., Knoxville, Tenn.; Florida Lime Co., Ocala, Fla.; Dixie Lime Products Co., Ocala, Fla.; Keystone Lime Works, Inc., Keystone, Ala.; Green Bag Cement Co. of West Virginia, Lawton, Ky., and Kenova, W. Va.; M. J. Grove Lime Co., Frederick, Md., and Stevensville, Va.; Ripplemead Lime Co., Inc., Ripplemead, Va.; Riverton Lime & Stone Co., Riverton, Va.; Jesse Allen Lime Co., Burns, Tenn., and George L. Scott, Sr., trading as Alabaster Lime Co., Siluria, Ala.

Although not organized as a formal trade association, the respondent producers of agricultural, chemical and building lime, it is alleged, engage in their price-fixing practices with the aid and coöperation of their paid representative, Hal S. Covert, Knoxville, Tenn., whom the amended complaint also names as a respondent.

The amended complaint alleges that by concerted action, agreement and understanding among themselves and with others not joined as respondents under the commission's complaint, the respondents have put in effect policies, practices and competitive methods including: (1) A system of non-competitive delivered prices; (2) use of so-called basing points whereby all delivered prices were calculated as though shipments were made by rail from a single point or points having a common freight rate to destination; (3) coöperative calculation and circulation among the respondent producers of freight rates from the respective basing points to various destinations; (4) agreement upon prices at meetings, and upon distribution by the respondent Covert of delivered price lists for use of the producers, and (5) agreement that the respondent producers would submit identical delivered prices, terms and sale conditions in sealed bids on invitations from city, state and Federal governments and would refuse to quote other than delivered prices.

The amended complaint also alleges that as a necessary result of the respondents' policies and practices—

1. Those of the respondent lime producers whose plants are not located at any basing point have frequently assessed and collected money from customers in the guise of freight charges but in amounts greater than the actual freight expense incurred and on sales made for local use they have assessed and collected such sums when no actual freight expense has been incurred.

2. The respective respondent lime producers have habitually and systematically charged and received more per unit of product from their customers located near their respective plants than from their customers located at greater distances and have thereby discriminated in price in bad faith in order to suppress price competition among the respondent lime producers.

It is alleged that for the purpose and with the effect of making more difficult the detection and prevention of their unlawful combinations, agreements and understandings, the respondents have destroyed documentary records and evidence of certain activities alleged in the complaint or have avoided compiling such records and evidence.

The respondents' agreements, understandings, policies and practices are alleged to have had the effect of depriving purchasers and consumers of the advantages of normal competition and of compelling unorganized purchasers to buy at artificially enhanced prices.

Staso Builds $260,000 Roofing-Granules Mill

A $260,000 plant for crushing and processing rock for the manufacture of roofing granules is under construction in Marinette County, Wis., by the Staso Milling Co., Chicago, Ill.

Contract for the plant buildings has been awarded the Austin Co., Cleveland, O., while the Bacco Construction Co., Iron Mountain, Mich., is doing the excavating.

Most of the output of the plant will be used by the Flintkote Co., manufacturer of prepared roofing, it is reported.

Adam L. Beck, Cement Pioneer, Dies at 77

HEADED GREAT LAKES COMPANY

Adam L. Beck, 77, president of the Great Lakes Portland Cement Corp., died August 10 at his home in Buffalo, N. Y., following a heart attack.

Mr. Beck and his father opened the first lime kilns in Huntington, Ind., his birthplace, about 50 years ago. He left there 30 years ago for Ada., Okla.,

Adam L. Beck

where he built a cement plant. Returning to Indiana, he established a plant at Limedale. He sold the Limedale plant to the Lone Star Cement Corp. and left for Buffalo, where he established the Great Lakes Portland Cement Co.

Throughout his career Mr. Beck kept his official residence in Huntington, Ind., where he owned an interest in the Western Rock Wool Co.

Surviving are the widow, one daughter, Mrs. Paul M. Taylor of Huntington, one sister and five grandchildren. The body was returned to Huntington for burial.

American Sealdrock, Inc., has moved its western offices from East St. Louis, Ill., to Cape Girardeau, Mo.

EMPLOYMENT AND PAY-ROLLS

(Compiled for PIT AND QUARRY by Isador Lubin, Commissioner of Labor Statistics, U. S. Dept. of Labor.)

Industry	Establishments	Number of Employees	Pay Rolls (1 week)
Cement:			
May, 1939	137	21,278	$536,731
June, 1939	137	21,428	585,270
Percentage change		+5.7	+9.0
Quarrying and non-metallic mining:			
May, 1939	967	34,129	744,589
June, 1939	967	35,453	784,566
Percentage change		+3.9	+5.4

EDITORIAL

The Building Industry

BEFORE the economic slump of 1929 the building industry had been the principal market for the construction materials supplied by producers of non-metallic minerals. When that demand practically disappeared under the conditions that followed, hundreds of plants were closed and the small number that could remain open operated on greatly reduced schedules. Until government spending for public works became a reality, the outlook was dark; a revival, though eagerly wished for, appeared very distant. In the last seven years government purchases have constituted the major demand for construction materials, rising to such heights that at times more than ninety per cent. of the materials produced by our industries have been used in construction projects financed or aided by the Federal government and its subdivisions. Despite the fact that government buying kept these industries alive, there was general recognition of the desirability of a return to former conditions, in which purchases for private use formed the mainstay of their existence.

No industry which is dependent on government purchases for the major part of its business can be expected to feel safe or to view its future without concern, for no industry which continues to look to government for its livelihood can long remain a private industry. In time the nature of its principal market will come to exert a tremendous influence in shaping its policies, changing its objectives, limiting its development, and dictating its profits. It is not likely to maintain industrial health, which requires a variety of demand, nor to continue to rely on individual initiative as the spur to its development, if it becomes merely a source of supply to satisfy government needs.

The building industry, therefore, has continued to offer the promise of industrial revival for which our industries have waited. Every upturn in construction activity, however slight, has been eagerly construed as a sign of final recovery and of the restoration of conditions that had previously maintained a good relationship between public and private demand. Now that the building industry has in recent months provided more significant evidence of its return to basic soundness, producers of construction materials are beginning to feel the stimulating effects of a demand that is not contingent upon the decisions of politicians but that comes from fundamental improvement in general economic conditions.

The building industry has made rapid progress in its return to healthy activity, yet its advance has been hampered by numerous obstacles. There has been too widespread a belief, for example, that recovery was impossible unless government provided material assistance in the financing of new houses. There have been obstacles of other kinds that have checked the rate at which the building industry should have recovered. While the record of building contracts awarded rose month by month late in 1936 and early in 1937, and it looked as if the long-looked-for revival had come, building costs increased at the same time and checked the upward trend. In all divisions of the building industry there appeared to be self-imposed restraints that checked every tendency toward recovery almost as soon as it became evident. The costs of financing private building were high and showed no signs of falling. Taxes remained high. Land-owners continued to expect more for their land than buyers could afford to pay. All the items entering into the cost of construction were high enough to retard natural progress. As soon as the demand for private construction appeared to increase prices were moved upward, in deference to a belief in the inevitable effects of the "law" of supply and demand, but to the detriment of the building industry and those dependent on it.

PRODUCERS of building materials have been accused of fixing prices through mutual understanding and agreement and through the activities of trade associations. Patent ownership has given some producers the power, not only to establish special price structures, but to limit the quantities of their products that may be sold, the terms on which they may be sold, and the customers to whom they may be sold. In some cases, it has been alleged, the monopoly opportunities provided by the ownership of patents on some products have been utilized to control the sale of products that have not been patented and to acquire rights in the latter by restrictive granting of rights in the former. The effect of such arrangements has been to limit the extent to which the products of inventive genius can be made available rather than to encourage their use. Criticism has also been made of special pricing systems which have made prices uniform throughout the country regardless of the location of the buyer with respect to the location of the producing plant, with the result in some cases that plants are wastefully located and their products shipped through needlessly and wastefully great distances. It has also been said that joint selling agencies, by means of which the available business is divided among the coöperating producers,

destroy true competition and greatly assist in maintaining high prices that would, under a system of free competition, be reduced enough to encourage buying on a greater scale.

In the field of building-material distribution similar restraining effects are obtained by other methods, it has been claimed. By the use of boycotts some distributing factors make sure that all the available business passes through their hands and prevent the introduction of any new or simpler methods of distribution which might reduce the cost to the ultimate consumer but which might impair their profits or infringe on the field that they have marked out for themselves. Boycotts are also employed to coerce material manufacturers into selling only to distributors who maintain the high prices on which the latter have agreed. And by collusion, it has been charged, distributors agree on a fixed price mark-up between the manufacturers' prices to them and the prices charged the consumer.

SOME contractors maintain clearing houses of bid information in which all bids on specific jobs are supposed to be filed prior to the contract lettings, and others maintain estimating bureaus where the costs of projected jobs are calculated and these comprise the prices at which all members are to bid, it has been claimed. Sometimes a central bureau determines the specifications for the materials to be included in the contractors' bids, so that by applying standard prices and standard labor rates all members can calculate identical bids. These practices have led in some instances to situations in which the contractor who is to get a given job is decided in advance, in which case all the other bids are higher than his bid.

Working with contractors, some building-trades labor unions have been the means of enforcing their employers' agreements by refusing to furnish labor on jobs from which the contractors wish to have labor withheld. In other cases they refuse to allow the use of new materials or methods which would reduce the amount of labor required on the job.

As if all these restraints were not enough, lawmakers add their restrictions by the enactment of laws that limit the kinds of materials that can be used. Beginning with the principle that property must be protected from the fire hazard and that health must be safeguarded, they extend their legal prohibitions to prevent the utilization of better products or cheaper products out of excessive regard for established materials and methods and, presumably, for the protection of certain manufacturing and contracting interests. The wishes of organized labor are not wholly disregarded in the building codes and similar restrictive measures adopted by municipalities. Thus, legally-established boycotts add the burden of their restrictions to those imposed by producers, distributors, and labor.

As long as such conditions continue it is perhaps naïve to expect a rapid revival of the building industry. Yet, in spite of these deterrents, private construction activity is increasing. It is difficult to believe that the rate of revival could not be greatly increased if only some of these and numerous other restraints of trade could be eliminated, or at least so reduced that their effects would be negligible, and it would seem wise for those who live out of the profits of furnishing materials to the building industry to strive for their control in the interest of the general good.

In a recent address before the New York Building Congress Thurman W. Arnold, Assistant Attorney General of the United States, discussed some of these activities which keep the costs of construction at high levels, and he mentioned some of the ways in which those who use such methods can be curbed. He assured his listeners that legislation adequate for the correction of the situation described already exists in the anti-trust laws and that the government is prepared to press for a change. "I am convinced," he said, "that if we deal in a coördinated way with the entire fabric of restraints, from the production of material through to the final work of labor, we can get cheaper houses by freeing the industry. . . . We must attack collusive combinations and boycotts both defensive and aggressive."

It is unfortunate, in our opinion, that the building industry does not contain within itself the means to further the interests of itself and its customers without the intervention of the law. Whatever desire for correction may exist within it appear to be too weak or too inaudible to effect much change in the direction of improvement. Yet it should be evident to all, the aggressive combinations which originate and exercise these restraints as well as those who remain outside their membership, that such practices, however great the immediate benefits to those who profit from them, can not, in the long run, operate in the interest of the majority of those in the industry.

"BECAUSE of the existence of aggressive combinations, experimentation in housing has to proceed by compromise with various gangs," said Mr. Arnold. "Both standardized equipment and experiments with standardized methods of construction are limited in large-scale housing projects largely because of these compromises. . . . In the past we have spent much of our energy in following complaints against particular concerns scattered here and there over the country. Such activity has had little effect because a house is the product of a tangle of goods and services. No one who furnished any single element which goes into the completed product can greatly raise or lower the cost of the whole product."

So, instead of regulating itself for the common good, the building industry is, apparently, to be exposed to a public drubbing from the outside.

The air-conditioned office and laboratory building with shop building in background.

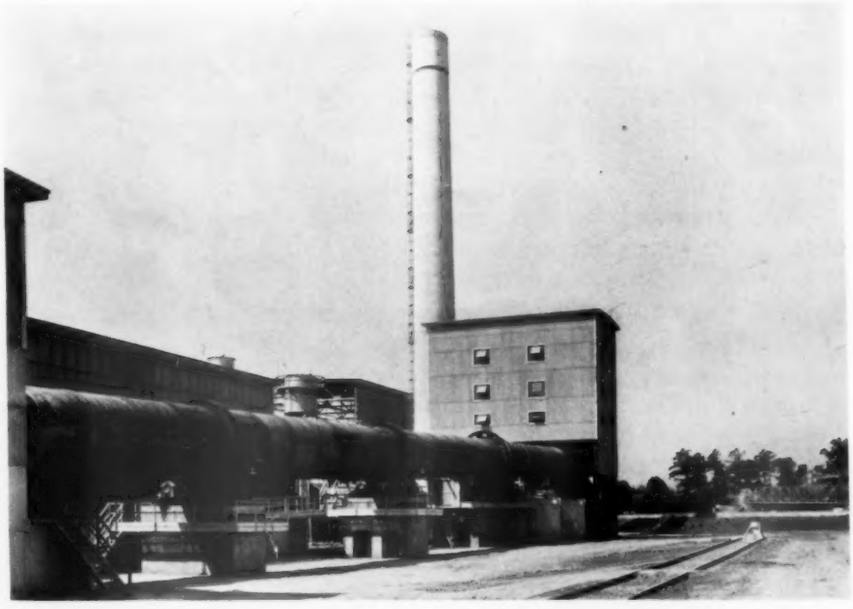
By W. E. TRAUFFER

Universal Atlas Plant at Leeds, Ala., Firm's Only Wet-Process Operation

ONE of the recent important developments in the cement industdustry in this country which has been receiving a large share of attention is the new plant of the Universal Atlas Cement Co. at Leeds, Ala. This plant replaced an old dry-process plant which had become practically obsolete and the modernization program included complete replacement of all the production equipment. Only the existing storage silos and two of the old kilns were retained, the latter as auxiliaries. This is also said to be the first plant in this country designed from the start for closed-circuit wet raw grinding. The modernization program was begun in the summer of 1937 and was completed in June, 1938.

The present plant is the outgrowth of one of the first Portland cement plants in the South. The original plant, built in 1905, had a single rotary kiln with a capacity of less than 500 bbl. daily. Operations were expanded from time to time and in 1930, when this plant was purchased by the Universal Atlas Cement Co., it had seven kilns of various sizes and a total capacity of 5,400 bbl. daily making modern cement. The present plant has about the same capacity and is the only wet-process plant operated by this company.

In designing this plant the company continued its policy, evident in its Hudson, N. Y., plant, of combining beauty with utility. Concrete was used wherever possible in the construction of the plant, which not only is, but also looks like, an up-to-date and efficient operation. The two old kilns retained are not visible from ordinary approaches to the plant.



The kilns with supply tanks and stack in background.

The first things a visitor sees on coming into this plant are the new office and shop buildings. These are built of architectural concrete and were designed by Warren, Knight and Davis, Birmingham architects. The office building, which also houses the laboratories, is completely air-conditioned. The shop building also houses the storeroom and both departments are complete in every detail.

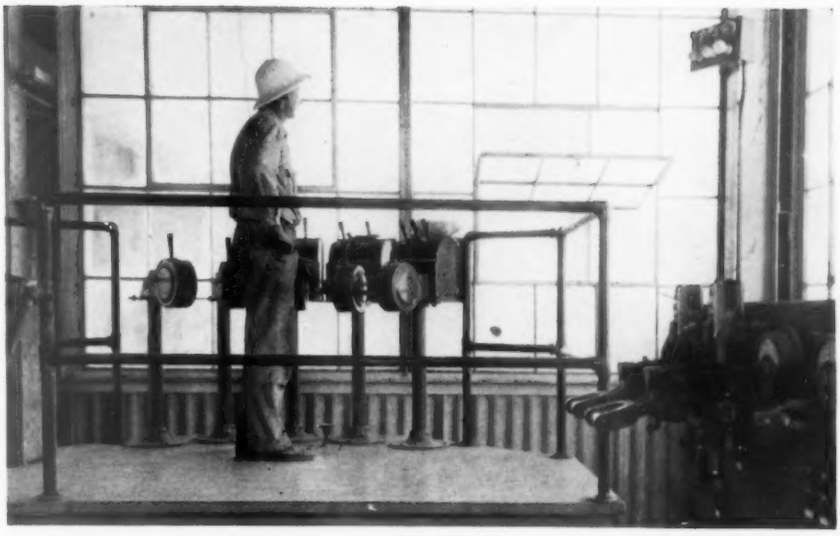
The limestone, which is about 84 per cent. of the raw material used in this plant, is secured from a quarry adjacent to the plant. Like most deposits in this section the surface is badly broken and the clay in the seams is shot down with the stone and is used in the mix. The overburden of 2 to 6 ft. in depth is removed. Electric crawler well-drills with 9-in. bits are being used on the 90- to 100-ft. face. Formerly 6-in. bits were used and the holes were spaced 12 ft. apart in each direction. The 9-in. holes are spaced 24-ft. apart, requiring only about one-fourth as many holes. The holes are loaded with 60-per cent. quarry gelatin and from 8 to 12 holes are detonated per blast. From 6 to 7 tons of rock is being brought down per pound of explosive, slightly better than formerly, and the breakage is just as good. Actually 50 per cent. more footage is being obtained with the 9-in. drills and the main saving is in the drilling.

The stone is loaded by a full-revolving crawler-type electric shovel with Ward-Leonard control and a 2½-cu.yd. dipper into the cars of the Woodford remote-controlled electric-haulage system. This system consists of four 18-

ton steel side-dump quarry cars, each operated individually by two 250-v. d.-c. motors mounted on the axles. These cars operate on a third-rail track system now about ¼ mi. long which has a 9-per cent. grade out of the quarry. A single track is used at the shovel and double track to the crusher building, so an empty car can be returned while a loaded car moves to the crusher, a third is being dumped and a fourth car is being loaded in the quarry. Movement of these cars at the shovel is controlled by the shovel operator. A tower at the crusher-house controls movements from the quarry to the plant. The car motors are regenerative and act as brakes when the cars run downhill. This system of haulage has been very satisfactory and is credited with lowering maintenance and labor costs in the quarry.

Great care is taken to keep the quarry clean and safe. A bomb-proof shelter houses the quarry workers during a blast. This shelter is made from two old ⅜-in. steel-plate tanks, one inside the other and separated by an 18-in. air space. The quarry floor is cleaned as operations progress. The 2,200-v. power cable for the shovel is carried over all the wet spots on wooden horses and the slack at the shovel is carried on a wooden sled.

In the crusher-house an overhead electric hoist controlled by the tower man dumps the contents of each car into the 42-in. gyratory primary crusher, which is driven through V-belts by a 250-hp. motor. The 6-in. minus product is discharged on an inclined pan-conveyor, which feeds it into a 42-in. by 66-in. hammer-mill. This mill operates at 900 r.p.m. and is direct driven by a 350-hp. motor. The hammers are double reversible with four surfaces to be worn out before they must be discarded. The breaker plate can be adjusted while the mill is in operation to compensate for hammer wear or for different sizes of product. Usually a 1-in. minus product is made with about 50 per cent. under ¼ in. in size. Both the hammer-mill and the pan-conveyor are connected to a cloth-type dust-collector.



The tower at the crusher-house from which the electric haulage system is controlled.

The product of the hammer-mill is discharged on an 80-ft. inclined belt-conveyor which discharges it into the raw-material storage. An automatic recording scale weighs the stone on this conveyor.

The shale and sandstone, which form about 14 per cent. and 2 per cent., respectively, of the raw material used, come from a quarry about a mile from the plant. A new 1½-cu. yd. electric shovel loads the shale into cars, which are hoisted up an incline to the crusher-house. A No. 5 gyratory crusher and a hammer-mill reduce the shale, which is then hauled by truck to a hopper at the cement plant. A belt-conveyor with an automatic scale discharges the shale into another section of the raw storage.

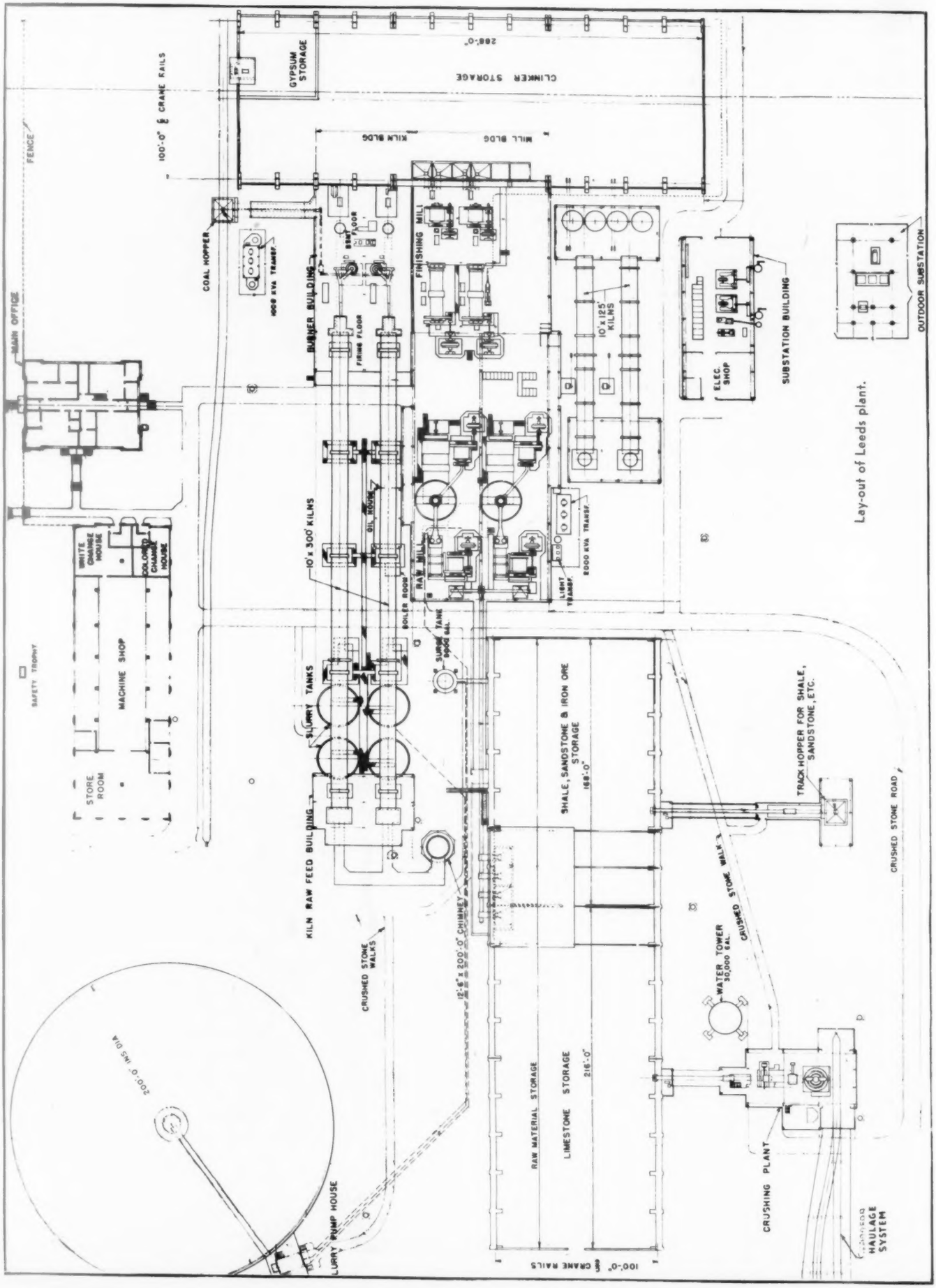
Sandstone is loaded by hand into cars and is crushed by the same crushers used for shale. The same system of haulage to the raw storage is used. It is possible to use the same equipment for both these materials as it is only necessary to operate these quarries intermittently. Iron ore is also stored.

The open raw-material storage is 384 ft. long and 100 ft. wide and the retaining walls and crane runway supports are made entirely of reinforced concrete. A 3-cu. yd. clam-shell bucket, operated from a 10-ton traveling crane, distributes the raw materials to storage and reclaims them from it. In storing these materials they are deposited in windrows the long way of the storage and in reclaiming they are picked up in cross rows. This results in a preliminary blending of each material.

The crane feeds the raw materials into four hoppers, one each for limestone, sandstone, shale and iron ore. Automatic belt scales under each hopper proportion these ingredients on a common belt-conveyor running to the raw-material grinding department. Each of these scales can be set to deliver a predetermined amount of material per hour based on regular analyses of the raw material. Safety switches on these scales shut them all down if one should fail.

An automatic gate at the discharge end of the blending conveyor alternates the discharge at regular intervals into the two 25-ton raw-material feed hoppers. These are equipped with electric high and low bin-level indicators which automatically control the feed. The alternation rather then the splitting of the feed to these two bins eliminates any possibility of segregation of the three or more raw materials used. Raw material is fed from these bins at a uniform rate by constant-weight feeders to the two

The two 200-ft. diameter thickeners which have capacities of 32,000 bbl. each.


Lay-out of Leeds plant.
CLINKER STORAGE
288'-0"
GYPSUM STORAGE
MILL BLDG
KILN BLDG
100'-0" ℄ CRANE RAILS
FENCE
MAIN OFFICE
COAL HOPPER
BURNER BUILDING
FINISHING MILL
10'x125' KILNS
ELEC SHOP
SUBSTATION BUILDING
OUTDOOR SUBSTATION
10'x 300' KILNS
RAW MILL
BOILER ROOM
SLURRY TANK
SLURRY TANKS
SHALE, SANDSTONE & IRON ORE STORAGE
168'-0"
TRACK HOPPER FOR SHALE, SANDSTONE, ETC.
CRUSHED STONE ROAD
KILN RAW FEED BUILDING
CRUSHED STONE WALKS
12'-6" x 200'-0" CHIMNEY
WATER TOWER 50,000 GAL.
CRUSHED STONE WALK
RAW MATERIAL STORAGE
LIMESTONE STORAGE
216'-0"
CRUSHING PLANT
HAULAGE SYSTEM
100'-0" ℄ CRANE RAILS
SLURRY PUMP HOUSE
200'-0" INS DIA
SAFETY TROPHY
STORE ROOM
MACHINE SHOP
WHITE CHANGE HOUSE
COLORED CHANGE HOUSE

wet raw-grinding circuits. These feeders are unaffected by the variations in moisture and clay content and other factors which made the table feeders originally installed unsatisfactory for this purpose. The moisture content of the raw material varies from 2 to 4 per cent.

Each of the two wet raw-grinding circuits consists essentially of a 9½-ft. diameter by 8⅔-ft. long ball-mill operated in closed circuit with a multi-zone rake classifier, the rake product going to a secondary ball-mill of the same size which is in closed circuit with a bowl-and-rake classifier.

The overhead crane with 3-cu.yd. clam-shell bucket in the raw-material storage building.

Each of the two preliminary mills and each of the two secondary mills is driven by a 350-hp. 2,200-v. high-starting-torque synchronous motor. They are operated at 19 r.p.m. and 17 r.p.m. respectively. All the mills are lined with rolled alloy-steel plates with 2½-in. bolted lifters which also hold the plates in place. Discharge-end grates in the preliminary mills have ⅞-in. slots and those in the secondary mills have ⅜-in. slots. The preliminary mills are loaded with steel balls of 4-in. size and under and the secondary mills with balls of 2-in. size and under. Additional top-size balls are added at frequent intervals through the feed scoops while the mills are in operation. The ball loads are maintained at from 38 to 40 per cent. of the mill volume.

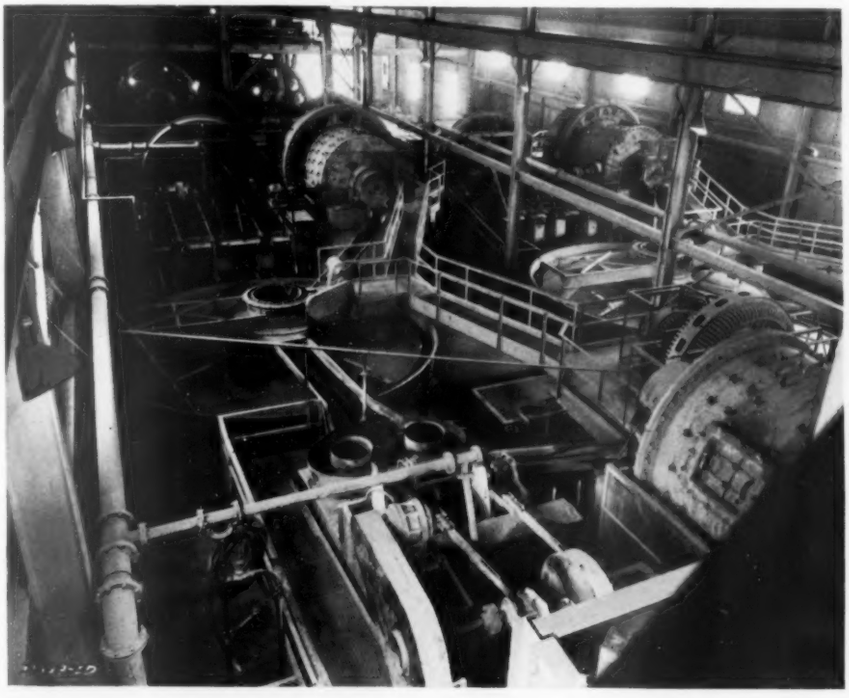
The primary mill receives, in addition to the raw materials, the oversize from the rake classifier. The mill product contains 25 to 30 per cent. moisture and goes by gravity into the 28-ft. by 8-ft. rake classifier. This classifier has two reciprocating rakes with 8-in. blades which carry the coarse material (plus 20-mesh) up an incline to a vibrating feeder which is at right angles to the flow and discharges it into a sump. This material is picked up by scoops and fed into the mill through the 24-in. diameter trunnion opening along with the raw-material feed and the required amount of water.

The finer material, containing approximately 50 per cent. moisture, overflows the rake classifier through two annular openings and is discharged, with the secondary-mill product, into the 25-ft. diameter bowl classifier. Rotating arms draw the coarse material settled out in this classifier through an opening in the bottom into its secondary rake compartment, which is also 38 ft. long and 16 ft. wide. Jets of water facilitate the transfer of this material. Four reciprocating rakes with 8-in. blades move this material up an incline to a revolving wheel-type elevator into the secondary mill, the product of which is returned to the bowl classifier.

The overflow of the bowl classifier (minus 200-mesh) is finished slurry with a moisture content of from 84 to 86 per cent. and goes by gravity to a pump sump. Both mill circuits discharge into this sump, which feeds two 3,500-g.p.m. rubber-lined centrifugal pumps. Only one pump is required to handle the total output, the other being kept in reserve. The pump valve is adjusted so that the pumping rate approximates the rate of discharge into the sump.

The 9-in. electric crawler well-drill which has reduced drilling and blasting costs.

The pump discharges the slurry into a distribution box, from which launders discharge it to the center of either of two 200-ft. diameter thickeners, each with a capacity of about 32,000 bbl. of dry raw feed. These thickeners are 10 ft. deep at their peripheries and 20 ft. at



The preliminary and finish grinding raw mills and classifiers. Clinker mills are in background.

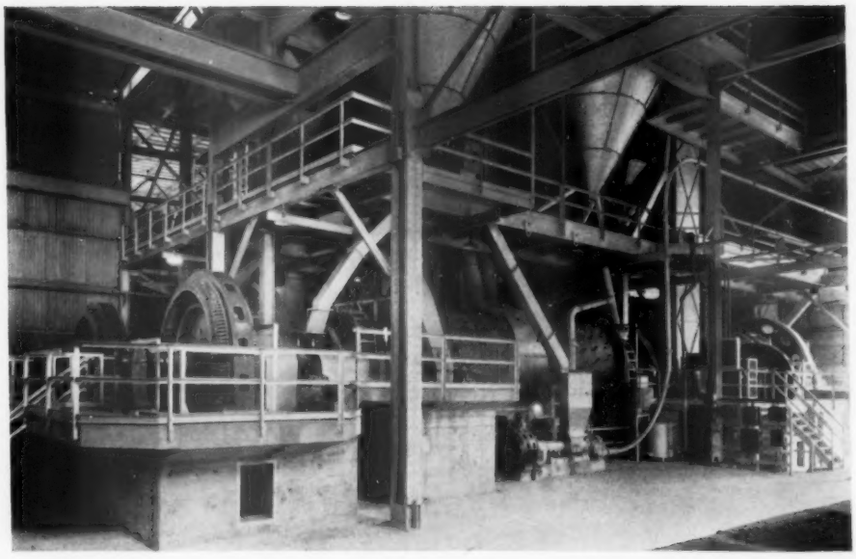
the centers. Settled material is slowly moved toward a center discharge opening by a revolving rake slightly shorter than the thickener's diameter. On each rake arm are diagonally-placed scraper blades. Each rake is driven at about 1¼ rev. per hr. by a 5-hp. vertical motor. On each arm is a 200-g.p.m. rubber-lined centrifugal pump which draws thickened slurry from the thickener discharge opening and discharges it into the thickener at the one-third and two-third points of the arms. This method accomplishes an added blending but results in some dilution of the slurry. This recirculation makes up for the intermittent feed to the thickeners caused by the fact that kiln requirements for seven days are ground in the raw department in from four to five days. On the idle days free settling conditions in the thickeners result in some segregation which would cause a variation in kiln feed but for the recirculation. The moisture content of the underflow of the thickeners has varied from 34 to 42 per cent., but improved methods of control have reduced it to 36 per cent. and the deviation is now less than 1 per cent. Water overflows the periphery of the thickener, and is returned to the water-supply system by two 3,000-g.p.m. centrifugal pumps.

The two thickeners are so installed that one may be used for standard Portland-cement slurry and the other for special cement slurry, either of which can be fed to the kiln on short notice. It has been found possible at times to use both thickeners in series for the same slurry and this method has resulted in an underfeed with a moisture content of only 31 to 32 per cent.

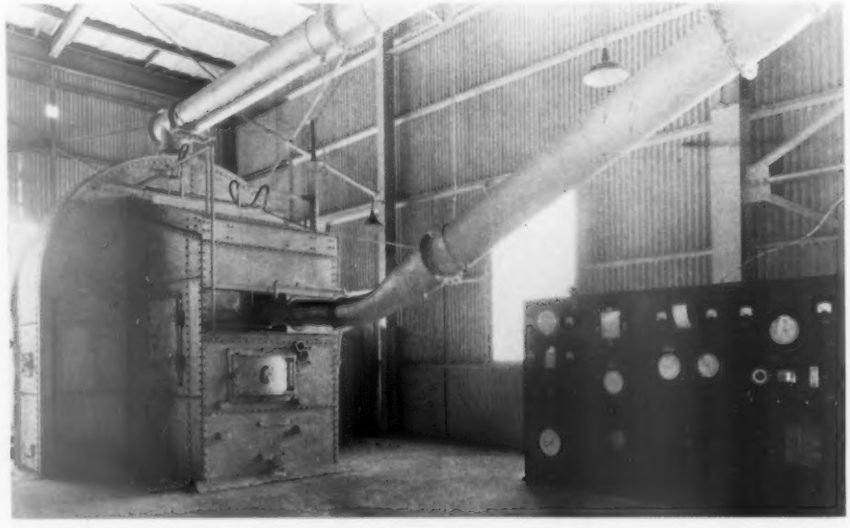
The entire wet raw-grinding system has come up to expectations. A uniform quality of slurry is fed to the kilns, making it possible to operate them at a constant speed with only slight variations in the firing. The blending control is so accurate that no correction is needed in the slurry tanks preceding the kilns. Lowering the specific surface by increasing the circulating load in the preliminary raw mills has had some effect and it is believed that the use of coarse discharge screens in these mills will also be beneficial.

The slurry is discharged from each thickener through four holes in the center cone. It passes through 6-in. lines into a box from which it passes through an 8-in. line into a common sump between the two thickeners. Each 8-in. line is equipped with a motor-operated gate valve and upper- and lower-level floats in the sump control, these valves maintaining the sump level between these two limits. These floats automatically control a motor which opens and closes the valve as the slurry level in the sump falls or rises. In case of the failure of one of the pumps the valves would be closed entirely. The motors are operated from storage batteries. All the slurry valves used in this plant are of the disk type and are similar to those ordinarily used on pneumatic cement-conveying systems. A 400-gal. per min. centrifugal pump delivers the slurry from the sump into supply tanks under the kilns. A second pump is kept in reserve. Two 3,000-g.p.m. centrifugal pumps return the clear water overflowing the thickeners into the water-supply system for the raw department.

The four 24-ft. diameter kiln supply tanks each hold enough slurry for about five hours' operation of both kilns. They are equipped for both mechanical and compressed-air agitation. Two centrifugal pumps under these tanks pump the slurry to the two scoop-type kiln feeders which have drive motors synchronized with the kiln-drive motors. This assures constant feed in proportion to the kiln speed. The pumps supply more slurry to the feeders than is re-



The preliminary and final clinker-grinding mills which are in closed circuit with the air-separators above.

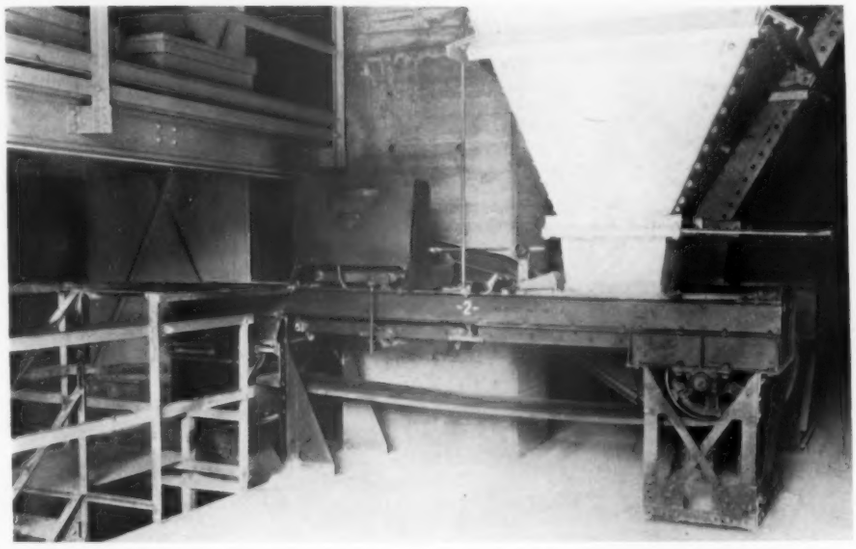


The firing hood of one of the two kilns with connection to cooler. At right is the kiln control board.

The 2½-cu.yd. full-revolving crawler-type shovel in the quarry.

quired and the overflow is returned by gravity into the tank from which it came. Space has been provided for slurry dewaterers or filters should it ever be decided to install them.

The bituminous coal used in the kilns is obtained in the vicinity of the plant. It contains an average of 5 per cent. moisture and is a 9-per cent. ash coal of 12,800-B.t.u. content. It is discharged from railroad cars into a track hopper from which it is conveyed and

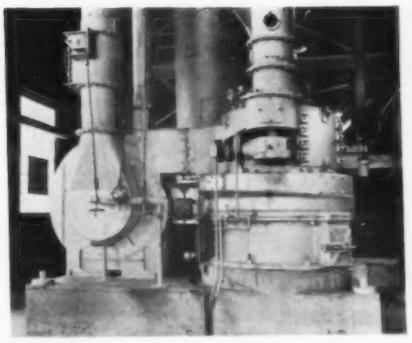


The automatic proportioning belt-feeders which feed clinker and gypsum to the preliminary grinding mills.

elevated into the two coal-mill feed bins. Coal is fed from these bins by means of integral table-feeders into the two ball-bearing coal pulverizing and drying mills which are of improved streamlined design. These have a lower grinding ring which revolves and a stationary upper ring, just the reverse of the old type. Diaphragm-type pressure controllers in these mills automatically vary the coal feed in proportion to the differences in pressure between the coal load in the pulverizer and the rate of air flow into the pulverizer, insuring a uniform rate of coal feed into the kiln.

Preheated air for drying the coal is usually drawn from the kiln hoods and the cooler brickwork. Adjustable sleeves make it possible to admit atmospheric air to regulate the temperature of the preheated air going into the mills. The mill-outlet temperature is kept fairly constant at 180 deg. F. The coal is carried into the kiln through a burner pipe with a water-cooled tip. The mills are driven by 75-hp. motors through V-belts, and the fans are driven by 60-hp. direct-connected motors. Each pulverizer has a capacity of 5 tons per hr. grinding to 80 per cent. through 200-mesh. The power requirements for the entire coal-grinding department including conveyors, elevators, etc., total 20 kw. hr. per ton.

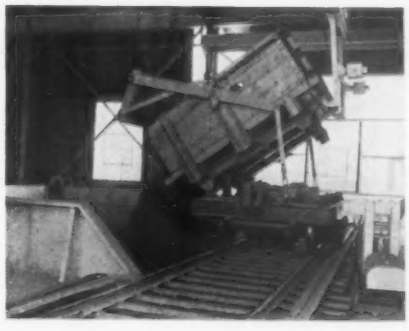
Each of the two new rotary kilns is 10 ft. in diameter and 300 ft. in length and is supported on five sets of 42-in.



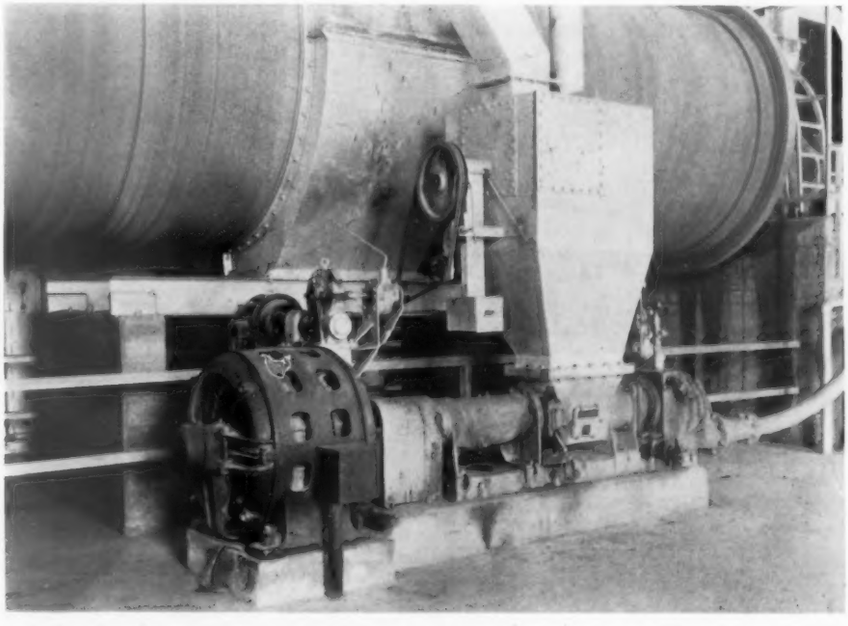
One of the two direct-firing ball-bearing type coal mills.

diameter forged steel rollers. Each kiln is driven by a 125-hp., 230-volt d.-c. motor with Ward-Leonard control, which makes possible accurate kiln-speed regulation in 100 steps up to 100 rev. per hr. Each kiln has a slope of 7/16 in. per ft. and has a riveted shell. Seal rings are used at the hood end. The first 230 ft. of length of each kiln from the feed end is lined with standard 6-in. fire-clay brick. The 60-ft. burning zone is lined with 6-in. high-alumina brick and the last 10-ft. section at the firing end is lined with 9-in. first quality, hard-burned fire brick. A 2-in. layer of insulation is used between the bricks and the shell for a distance of about 150 ft. from the end of the burning zone to a point about 80 ft. from the feed end. One kiln was equipped with 35-ft. heat exchange chains at the start and the installation of similar chains in the second kiln has just been completed.

Pending the installation of these chains the kilns were operated under natural draft. An 8-ft. 4-in. diameter by 4-ft. fan has just been installed to serve both kilns, and the use of induced draft has smoothed out all ir-



One of the dual-motored remote-controlled quarry cars at the primary crusher.



The pneumatic-conveying system which feeds finished cement from the separators to storage silos.

regularities in burning. The capacity has also been increased and each kiln is now producing 2,000 bbl. per day at a speed of 1 r.p.m.

The exhaust gases are drawn from each kiln through individual flues with motor-driven louvre dampers having

The two rubber-lined centrifugal pumps which feed slurry to thickeners.

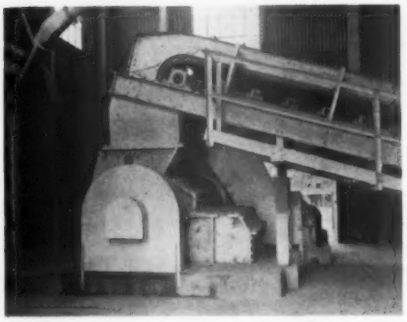
automatic draft control. A common flue leads the gases to the fan, through which they pass into the reinforced-concrete kiln stack which is 200 ft. high and has an interior diameter of 12½ ft. The flues have hopper bottoms, from which the settled dust is collected by

The primary gyratory crusher with pan-conveyor to secondary crusher.

screw-conveyors and is elevated to the feed end of the kilns to be fed in with the slurry.

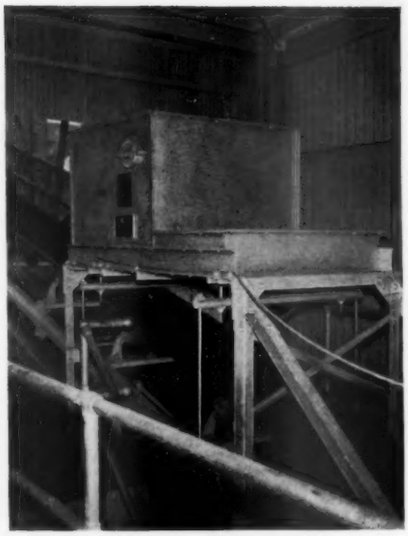
These kilns have less slope than those of similar length in most other plants and are operated at a higher speed. It is the company's intention to operate them ultimately at a speed of about 70 rev. per hr. Extensive experiments have shown that increasing the speed of a kiln increases its output and decreases the fuel consumption per bbl. This is known to be true up to a speed of 75 rev. per hr. beyond which no tests have yet been made.

One of the explanations given is that running a kiln fast results in a thinner bed of clinker in the kiln and in the exposure of a greater percentage of the particle surface to the heat of the flame and of the refractories. Greater agitation of the clinker is also considered to be a factor. Experience has also shown that the lining in the burning zone is kept at a lower temperature, resulting in a smaller radiation loss and lower back-end gas temperatures due to the more efficient transfer of heat. Longer lining life is also expected. The exit-gas temperatures now average 700 deg. F. A fuel rate of under 100 pd. per bbl. is obtained with 12,800-B.t.u. coal.



The 42-in. by 66-in. hammer-mill used for secondary crushing.

Clinker is discharged from each kiln through one compartment of a vertical brick chute into an air-quenching clinker cooler. The other compartment admits secondary combustion air from the cooler to the kiln. The two coolers are of the vibrating-grate type with grates 4½ ft. wide and 70 ft. long. A 22-ft. section at the feed end of the grate is regarded as the primary cooling section, air for which is supplied by a fan with a capacity of 20,750 c.f.m. at 4-in. static pressure. A louvre-type damper, controlled automatically by an air motor through pressure differentials, maintains a constant air supply regardless of temperature or atmospheric conditions. The grates in the first two feet of this section are set at an angle and give the clinker a quick preliminary air-quenching with air from the same fan. A hinged and movable baffle plate, suspended above the grate near the end of the primary section, insures the delivery of this air to the kiln as secondary combustion air. Air passing through the secondary cooling section beyond this plate is wasted through a steel stack. Cooling air for this 48-ft. section of the grate is supplied by a fan at the rate of 34,800 c.f.m. at 2-in. static pressure. The cooled clinker is at near atmospheric temperature and can be ground at once if desired. It is discharged from the coolers into elevators which transfer it to the storage. This air-quenching cooling method is credited with improving the grindability of the clinker and with keeping it within narrow limits. Clinker enters these



The automatic recording scale which weighs the stone going to storage.

coolers at a temperature of about 2,600 deg. F. and leaves them at about 100 deg. F.

The clinker-and-gypsum storage is 288 ft. long and 100 ft. wide and, like the raw storage, is built of concrete and has a 10-ton traveling crane carrying a 3-cu. yd. clam-shell bucket. The clinker is distributed in longitudinal rows and reclaimed in cross rows. The gypsum used comes from the company's quarry at Watonga, Okla. This crane transfers both clinker and gypsum from storage to separate hoppers for each material for each of the two finish-grinding circuits.

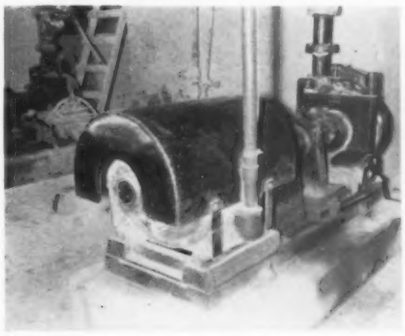
One of the two air-quenching vibrating-type clinker coolers.

Automatic proportioning belt-feeders under these hoppers feed the clinker and gypsum in the desired proportions to elevators which, through screws, supply the two preliminary-grinding ball-mills. These mills are 9 ft. in diameter and 8½ ft. long and are loaded

to about 40 per cent. of their volume with a graded charge of balls ranging in size from 3 in. down. The product of each preliminary mill is discharged to an elevator feeding a secondary mill.

Each of the secondary mills has two compartments and is 8 ft. in diameter and 30 ft. long. Each compartment is loaded to about 40 per cent. of its volumetric capacity, the first with 1¼-in. minus and the second with ⅞-in. minus steel balls. Each mill is operated in closed circuit with a 16-ft. mechanical air separator. Each compartment is fed through the trunnions and discharges at the center to an elevator feeding the mill's separator. The product of the first separator is the fresh feed for the second separator. The product of the final separators is finished Portland cement.

All four mills are lined with rolled-



One of the two 4-in. pumps which transfer slurry from thickener to kiln supply tanks.

steel plates having lifting elements similar to those in the raw mills. Each preliminary mill is driven at 19 r.p.m by a 350-hp., 2,200-v. synchronous motor with a high starting torque. Each finish mill is driven at 18½ r.p.m. by a 700-hp. motor of the same type. These mills have babbitted water-cooled bearings. The entire finish-grinding department consumes from 7 to 7½ kw.-hr. of electricity per bbl. at an output of about 150 bbl. per mill-hr.

When grinding standard Portland cement, the product of the preliminary mills averages 45 per cent. through 200-mesh with a specific-surface area of 450 sq. cm. per gram. The preliminary

One of the gasoline locomotives used in the plant yard.

A view in the laboratory showing the moist cabinet and other equipment.

separator fines fed to the secondary or finishing mills average 82 per cent. through 200 mesh with a specific-surface area of 1,200 sq.cm. per gram. The product of the final separators, finished cement, averages 96 to 97 per cent. through 200-mesh with a specific-surface area of 1,750 sq. cm. per gram. This type of circuit allows any desired degree of fineness to be obtained at will.

Each clinker-grinding circuit is connected to a cloth-type dust-collector, which provides a negative pressure and air-circulation in the mills and their elevators and conveyors. Each collector draws air at a rate of about 7,000 c.f.m., which has an appreciable cooling effect in the system. The collected dust is discharged continuously to the elevators feeding the preliminary-mill separators.

A pneumatic conveying system is used to pump the finished cement into the two groups of storage silos. The 12 old silos have a total capacity of 65,000 bbl. The 8 new silos have a total capacity of 165,000 bbl. Cement is withdrawn from these silos by screw-conveyors for bulk loading or for packing.

A book could be written about the design of the electrical system alone. Every effort was made to obtain maximum efficiency and safety. No fuses are used in any motor or lighting circuits, circuit breakers being used throughout. In selecting the motors for this plant horsepower requirements were grouped to reduce the number of sizes for which replacements must be stocked. For example all 2-, 3- and 5-hp. requirements were all filled with 5-hp. motors.

Thixotropic Properties of Bentonite Vary

Laymen whose activities lead them only occasionally into the field of colloidal phenomena may be grateful for a nontechnical discussion of "thixotropy," a relatively new addition even to the scientist's vocabulary.

One of the most important thixotropic materials is rotary-drilling mud. In drilling oil wells, for example, mud is pumped down the drill pipe of a well (1) to flush away the cuttings and bring them to the surface through the outer casing, (2) to seal the walls of the hole, and (3) to prevent gas pressure from blowing out of the hole. Formerly high-density mud tended to settle and to pack solid when drilling operations were halted in a well with the result that tools might be broken when work was resumed. By adding suitable proportions of bentonite, this difficulty is avoided. Muds so treated set to a soft clay when not agitated but become fluid again as soon as they are agitated again by the drilling operations. Such thixotropic muds are widely used by oil companies all over the world.

Thixotropy has been defined as an isothermal and reversible decrease in viscosity with an increase in the rate of shear. More simply, a gel is thixotropic if it is liquefied to a sol on shaking and forms a gel once more when allowed to stand. The word "gel" is virtually equivalent to "jelly"; and a "sol," instead of its crossword puzzle connotation of "the sun," means simply a mixture of colloid and liquid that is still liquid. Grandmother's jelly was a reversible gel, ordinary glue or gelatin is another, but such gels are altered to sols by heating whereas the thixotropic kind miraculously changes by being stirred or shaken.

Particle size has a profound influence upon the thixotropic behavior of some materials but the thixotropy of bentonite suspensions, according to a recent paper by Dr. Herbert Freundlich (*Thixotropy and Its Industrial Applications:* Can. Chem. and Process Indust., April 1939, p. 173) is independent of the particle size of the bentonite. However, close correlation exists between the extent of hydration and the degree of thixotropy. The most pronounced thixotropy occurs at the point of greatest hydration.

Bentonite is virtually the only inorganic material that swells, and the thixotropic property seems to vary with the degree to which it can swell.

In thixotropic systems, particles are probably partly flocculated. Loose packing, with consequent large sedimentation volume, favors thixotropy, while close packing favors dilatency. Certain gels, notably suspensions of gypsum or suitable mixtures of caustic potash and bentonite, that may take a long time to solidify into a relatively stiff mud or jelly when left quite still, can be converted into a gel almost immediately by making them move slowly. This phenomenon, too, has a name —"rheopexy." Whereas thixotropy produces a liquid by relatively violent agitation, rheopexy causes jellification by gentle agitation. (Paul M. Tyler, U. S. Bureau of Mines.)

The two bituminizing plants operated by McGuire & Rolfe.

Bituminizing Plants on Potomac Use Both Hot and Cold Mixing

THE District of Columbia and the city of Washington have for many years been considered one of the most active centers of new construction in this country. The population of this area has grown rapidly with a consequent demand for new construction of various kinds. The construction industries have naturally profited by this activity but there has been little profiteering because of the intense competition for the work. This is true particularly of the asphalt business, wherein competition is so keen that only the most efficient and economical operations can survive.

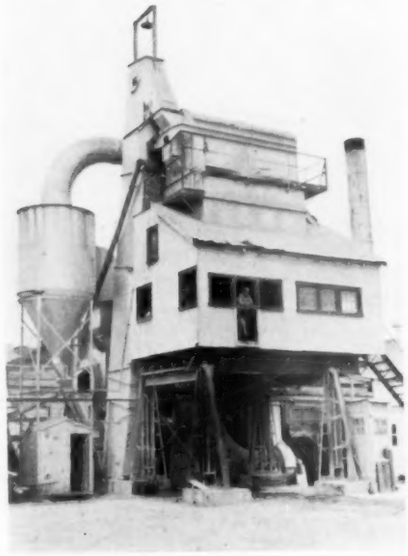
One of the most important producers of bituminized aggregates in the districts is the firm of McGuire & Rolfe. This company, which has been a paving contractor for many years and an asphalt producer since 1922, in 1931 erected a Simplicity Systems hot-mix plant at 30th & K Sts., N.W., near the Georgetown section of Washington. This plant was built primarily to supply material for the company's contracts but some was also sold. The demand for cold mixes soon began to increase and in 1933, because of the inconvenience of producing both types in the same plant, and of the growing demand, a second Simplicity Systems plant for cold mixes was built alongside the original plant. The cold plant can produce over 500 tons in 8 hr. The hot plant's capacity is 300 tons of topping or 400 tons of binder.

These plants are located on the bank of the Potomac River. River sand is received in barges and other materials, including crushed stone, lime, limestone dust, bitumen and fuel oil, are received by railway. Aggregates are unloaded by cranes to stock-piles or to the plant bins.

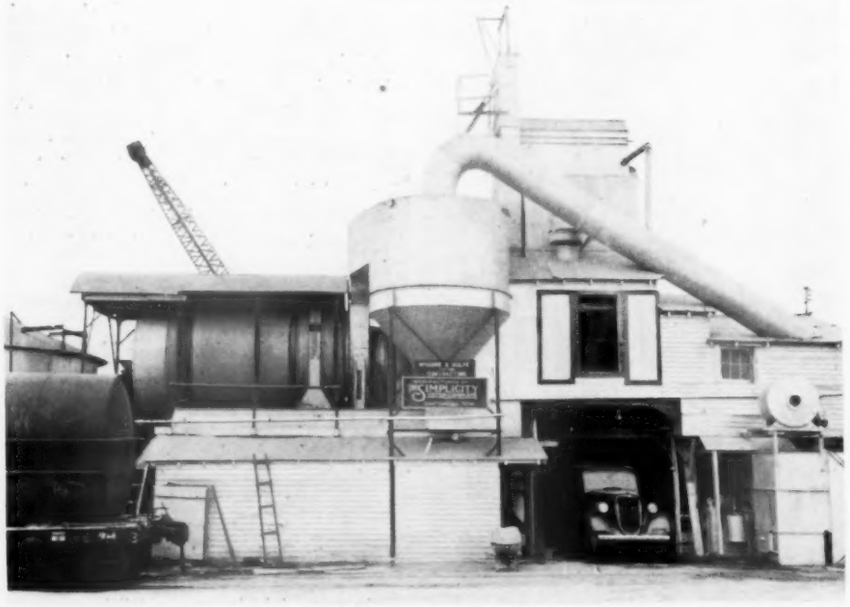
In the hot plant aggregates are discharged from their bins to a bucket-elevator feeding a double-shell rotary drier fired with Bunker C fuel oil. Another elevator discharges the dried aggregates on a vibrating screen from which the re-separated aggregates drop into a 3-compartment storage bin. Aggregates are weighed in a 1-ton batcher and asphalt is weighed in a steam-jacketed bucket with a sliding discharge gate. The 1-ton Simplicity mixer is equipped with steam-operated discharge gates.

The cold-mix plant is similar in design and construction except that all the equipment is larger to serve the 2-ton mixer used.

Asphalt for both plants is heated by steam from a 125-hp. boiler. The hot plant is driven from a single 100-hp. electric motor through line-shafts and chains. In the cold plant a 75-hp. motor drives the mixer and elevator. The drier and related equipment are driven by a 50-hp. steam engine. The driers are equipped with cyclones but have been supplemented recently by Ducon dust-collectors.



The cold-mix plant.



Truck loading beneath mixer in the hot-mix plant.

Details of a Recent Blast at Rock Chapel Quarry

By NELSON SEVERINGHAUS
Superintendent,
Consolidated Quarries Corp.

BECAUSE of the excellent results obtained in a granite rock difficult to shoot, the blasting methods used at the Consolidated Quarries Corporation's Rock Chapel quarry near Lithonia, Ga., have drawn the interest of many other producers. This article presents details of procedure, equipment and explosives involved in a recent typical blast which gave very good results.

The quarry face at Rock Chapel is now about 125 ft. high and 1,200 ft. long. Six-inch diameter holes are drilled by a No. 14 Sanderson Cyclone blast-hole drill to 5 ft. below the floor level. They are spaced 32 ft. apart and are 15 ft. from the face. Experiments which led to this spacing were described in Technical Publication No. 878, American Institute of Mining and Metallurgical Engineers. The relation of the spacing to the burden is unusually large but gives the best results in this rock. To insure a correct measurement of the burden, marks are painted on the rock 30 ft. behind each hole before shooting. It is then easy to measure 15 ft. forward from these marks to locate the proper line for the next row.

As soon as a hole is finished, it is capped with a slab of rock sealed around the edges with concrete (Fig. 1). This keeps anything from washing in to partially fill the hole and change it from its proper depth. The slab is readily removed by tapping it with a hammer or bar when the loading time comes. The depth of the hole is marked in the concrete at the time of sealing. This gives an easy way of checking the dimensions to figure the tonnage before shooting.

Fig. 1. Stone cap cemented over well-drill hole.

The burden and spacing mentioned, with solid-column loading of 5½-in. by 24-in. Nitramon "B" to within 10 ft. of the top, gives very close to the desired loading factor of 3½ tons of rock per pound of explosive. Experience here has shown that stemming between the charges gives poorer breakage than solid-column loading.

When the loading time comes, the capping is removed and water "bailed" out with an air-displacement cylinder shown in cross section in Fig. 2. This cylinder is lowered to the bottom of the hole by means of the attached hoses. The alternate admission and exhaust of air by hand operation of a two-way cock in the air-line then "pumps" out the water. For the average hole this takes about 20 min. This is considerably faster and takes less labor than bailing. Given one or two holes "head start," it will keep ahead of two loading crews.

Lowering of the Nitramon into holes is done with the hand-operated reel shown in Fig. 3 with W. D. Carder, quarry foreman, standing beside it. This has a 3/32-in. airplane-strand cable and a hand brake for lowering. A dial connected to the drum shaft by a worm gear shows the depth of the hook below the surface at any time, eliminating the need of frequent measurement.

Cardboard boxes containing Nitramon cans are opened by a hand hook shown atop the right-hand can in Fig. 4. This hook is also used in handling the cans. The "fishing tool" on the left-hand can in Fig. 4 is used for removing cans from a hole when necessary. Occasionally a can will rest on a shelf before reaching the bottom and come off the lowering hook. The "fishing tool" readily removes such a can for more careful lowering.

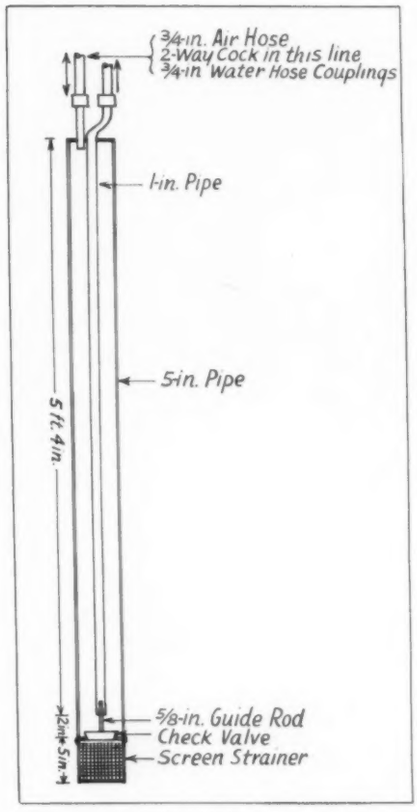


Fig. 2. Sketch of the air-displacement cylinder.

Three Nitramon Primers are placed in each hole. They are spaced about even distances from each other and from the top and the bottom of the hole. They are strung on wire-coun-

Table I—LOADING DATA FOR A BLAST AT THE ROCK CHAPEL, GA., QUARRY CONSOLIDATED QUARRIES CORP., JAN. 20, 1939

Hole No.	Depth	Spacing (ft.)	Average Spacing (ft.)	Burden (ft.)	Rock (tons)	3.5 Tons to Pound	Actual Load		Stemming (ft.)
							5 by 24 Primers	5½ by 24 Nitramon B	
1	108	33	32	15	4,320	1,234	3	42	10
2	113	32	32	15	4,520	1,291	3	48	10
3	117	31	32	15	4,680	1,337	3	47	14
4	120	32	32	15	4,800	1,371	3	50	11
5	125	32	32	15	5,000	1,429	3	54	9
6	125	32	32	15	5,000	1,429	3	53	10
7	125	32	32	15	5,000	1,429	3	54	10
8	126	32	32	15	5,040	1,440	3	54	9
9	128	32	32	15	5,120	1,463	3	55	10
10	128	32	32	15	5,120	1,463	3	55	10
11	131	32	32	15	5,240	1,497	3	56	10
12	130	32	32	15	5,200	1,486	3	56	10
13	130	32	32	15	5,200	1,486	3	54	14
14	128	32	32	15	5,120	1,463	3	56	11
	1,734		448	210	69,360	19,818	42	734	

Number of Holes.....14
Depths.....108 to 131 ft.
Average Spacing.....32 ft.
Average Burden.....15 ft.

Total Rock.....69,360 tons
Total Nitramon B 5½ by 24.....18,350 lb.
Total Nitramon Primers 5 by 24.....916 lb.
Total Explosives Charge.....19,266 lb.

Fig. 3. Reel for lowering explosives.

tered Primacord which reaches from the hole top to the bottom primer. When all the holes are loaded and tamped with stone screenings, a No. 6 electric blasting cap is attached to the Primacord at each hole with a special union. These caps are connected in parallel to No. 12 rubber-covered wire. A cap on each hole gives better breakage than trunk-line detonation.

The shot is "fired" from a switch in the crusher building, from which point the whole quarry face can be seen. The current used is 550-v., 60-cycle. Excellent photographs taken before, during and after the last shot are shown in

Fig. 4. Fishing tool and handling hook on explosives cans.

Figs. 5, 6 and 7. Note the absence of back-break and the good distribution of broken stone on the quarry floor for crawler-shovel and truck removal. A row of holes drilled 15 ft. behind those shot were not seriously disturbed.

Explosives for the secondary breaking of such a shot will run about 0.07 pd. per ton of stone.

A loading chart for this shot similar to the record kept on all shots is shown in Table I.

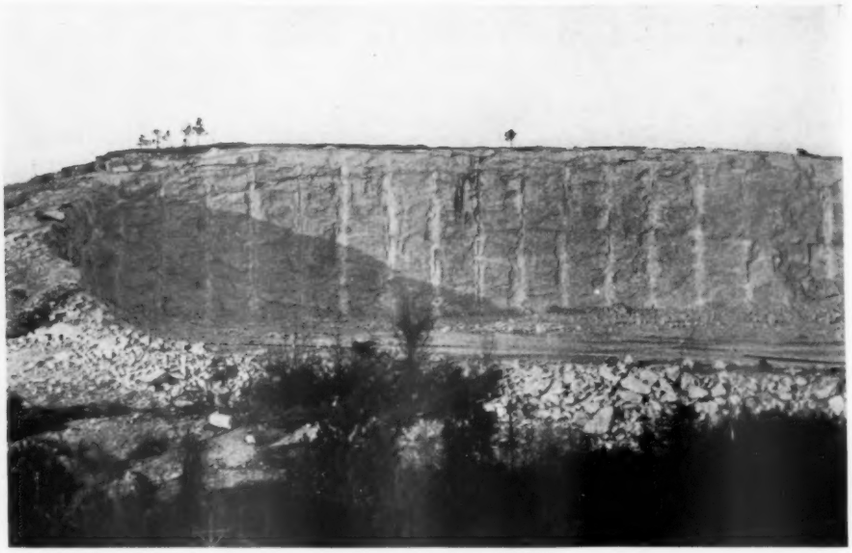


Fig. 5. Before the blast.

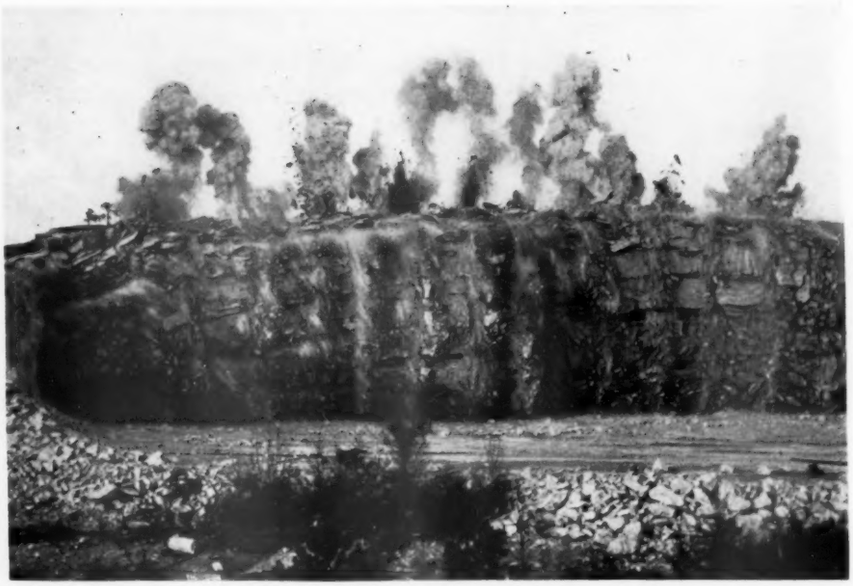


Fig. 6. During the blast.

Fig. 7. After the blast.

The Government's Investigation of the Building Industry*

By THURMAN W. ARNOLD
Assistant Attorney General
of the United States

A HOUSE is the product of a tangle of goods and services. No one who furnishes any single element who goes into the completed product can greatly raise or lower the cost of the whole product. Neither a single heavy industry, nor the distributors of its products, nor the contractors who install them, nor the labor which works on them, operating alone, can do anything by vigorously competing more than handicap themselves for the advantage of others. Like a number of dogs who have hold of the same piece of meat, none of them dares drop it because he would lose out completely. This is an analysis by way of figure of speech. Suppose we make it more concrete. It means that no major economic purpose can be attained by pursuing a labor union in Los Angeles, a group of contractors in Chicago, and a heavy industry in New York for anti-trust violations in the building field. Of course, it is our duty to prosecute complaints, and isolated prosecutions may protect particular competitors from injury. But the economic results in housing can only be accomplished by prosecuting on a nation-wide scale, and simultaneously, the various combinations which are creating the log jam in the building industry.

The building industries are unique in that they have frankly given up half of their job. They take for granted that it is impossible, as things are to-day, for them to build houses without public aid and sell them cheaply enough that the lower-paid half of the population can afford to live in them. This has been true for four reasons: that financing costs were high, that taxes were high, that land was high, and that the costs of construction were high. Recently a broad Federal and state program has undertaken to provide adequate cheap credit and even subsidies. But the easing of this difficulty has afforded an opportunity for costs of construction to go still higher.

During the latter half of 1936 and the beginning of 1937 students of housing believed that the long-delayed revival of building was at last at hand. Building contracts rose month by month. But building costs rose at the same time and choked the revival. In a number of our large cities the rise of building costs was more than 25 per cent. In more than half the cities reporting it was over 10 per cent. The collapse of construction followed and contributed much to the recession in 1937.

Unreasonable restraints of trade are, in my opinion, the most conspicuous reason for high construction costs. They appear at every level of the building industry. To give a picture of the problem, I shall list typical practices of the building industries which have been found in recent government proceedings or investigations or are involved in substantial complaints to the Anti-trust Division.

1. *Producers of Building Materials.*—Producers of building materials have fixed prices, either by private arrangement or as the principal activity of trade associations. Owners of patents on building materials have used them to establish restrictive structures of price control, control of sales methods, and limits upon the quantities sold, in direct contradiction of the broad intent of the patent laws to encourage, through inventions, the development and spread of new productive methods. Some of these patent holders have taken advantage of their control over patented products to require their licensees to give them control of unpatented products also. By the use of basing-point systems and zone price systems various building-materials industries have established by formula a rigid structure of uniform prices throughout the country; and in some of these industries such price formulas have encouraged the wasteful location of industrial plants and the wasteful shipment of products to great distances. The use of joint selling agencies has been another means by which some of these groups have undertaken to maintain their prices. In some groups the various producers have subscribed to the theory that every member of the industry should have a definite share of whatever business there is to be done, and that no concern should try to get more than its share by price competition.

Supplementing these various devices for keeping the prices of building materials high have been a series of other devices used to discipline competitors who are unwilling to "play ball." In one industry the means is cutting off the supply of raw materials. In another it is starting a series of harassing lawsuits. In a third it is the harassment of distributors by selling through the seller's own factory branches at prices lower than those at which the distributor is permitted to resell. In a fourth it is the maintenance of orthodox channels of distribution by concerted refusal to sell to groups representing new methods of sale or new price policies.

Overlying this mass of practices, often as a result of the pressure placed upon the weaker and smaller competitors, there is a growing concentration of control in many of these industries. For the most part the increase in the size of the business unit has not been the necessary result of more expensive machinery and bigger plants; it has come about by the merger of competing enterprises which continued after their union to produce in very much the same way as before. Its chief significance has been an increase in the power of the particular business unit and greater ease in reaching an understanding with the two or three other larger concerns in the industry.

2. *Distribution of Building Materials.*—Various groups of distributors of building materials engage in two kinds of restrictive practice. First, they try to raise the price of their services by establishing a fixed mark-up between the price they pay the manufacturer and the price at which they resell. For this purpose they collusively determine their mark-up or their selling price, and sometimes agree among themselves to boycott manufacturers who will not cut off supplies from price-cutting distributors. Sometimes they conspire with manufacturers' groups to establish a joint price control binding upon the manufacturers' and the distributors' organizations alike.

The second type of restraint by distributors arises from the effort to see to it that all business passes through their hands and that no new methods of distribution are introduced which may dispense with their services. The great weapon in this field is the boycott. Groups of wholesale distributors may boycott those who sell direct to retailers. Groups of retailers may boycott those who sell direct to mail-order houses or direct to the ultimate consumers. Sometimes the members of a distributors' organization will boycott any manufacturer who sells in their territory to nonmembers. To secure freedom in methods of distribution some manufacturers have found it necessary to pay the dis-

* Part of an address before the 24th Annual Convention of the National Assn. of Purchasing Agents.

tributor a commission on sales even when the customer and the manufacturer have dealt direct and the distributor has had no part in the transaction.

3. *Contractors.* — Contractors who erect buildings add their own systems of restraint. Many contracting groups maintain bid depositories in which copies of all bids and estimates are supposed to be filed prior to the award of the contract. In some of these depositories the bids are opened before the contract is let and the information thus obained is used to coerce low bidders to withdraw or raise their bids. Other contractor groups maintain central estimating bureaus which calculate the cost of the job and supply the various contractors with the bids they are to make. In still other groups a central bureau determines the specifications for materials and labor to be included in the bid, and the contractor is expected to apply standard prices and labor rates to these specifications and thereby to arrive at the same bid as every one else. Some bidding rings determine in advance which contractor is to get the job and arrange their bids so that every one else bids higher than he.

In addition to these efforts to control their charges for service, many of these groups set up little closed markets from which they exclude outside contractors or new types of services. They may try to keep all the contracting work for local contractors or for contractors who are members of the association. They may refuse to use materials which have been bought from any source of supply other than themselves. They may insist that prefabricated products not be used in the buildings they work in. They may coöperate with contractors interested in other materials, so that no contracting group will work on a building if a product assembled at the factory is used contrary to the wishes of some other contracting group.

4. *Labor.*—The building-trades unions often participate in these policies of restraint and add new restraints of their own. In recent years they have frequently been used as the strong-arm squads for collusive agreements among contractors, refusing to supply labor where the contractors' ring wishes labor withheld. In other cases the unions themselves have refused to permit the use of new products or new processes because of their fear that the new method might make it possible to erect a house with fewer hours of labor than the old. Where such a pattern of restraints has resulted in the development of a considerable number of independent contractors who threaten to use non-union labor, some unions have evolved two official scales of wages for the same work—one to be applied in private work awarded to the independent contractor and a higher one to be charged on public contracts in which the conditions of award require that full labor rates must be paid.

5. *Local Legislative Restraints on Trade.*—As these restraints have been incorporated in the habits of the building industries, they have come to be taken for granted and have even been written in the law.

(a) Oppressive Building Codes.

By the pressure of organized groups, the building codes of many cities have been so devised that cheap materials and economical methods of construction are forbidden.

(b) Licensing and Registration.

In a number of states statutes requiring the licensing of contractors by boards composed of contractors afford a ready means of discipline over out-of-state bidders or new and small concerns which may threaten to break an existing scheme of control. Thus, some of the very administrations which have been willing to spend money on housing in order to clear out their slums, reëmploy their citizens, and provide adequate housing for their people have been setting up barriers to an efficient performance of this job and an economical use of this money.

Can the anti-trust laws deal with this situation? My answer is an emphatic "Yes," as far as the laws themselves are concerned. I frankly admit that they have not dealt with it adequately in the past in spite of the fact that throughout the entire history of the Anti-trust Division about one-quarter of the cases have been in the building industry. The reason for that failure, however, is not in the law. It rests on two obvious principles. First, you can not police America with a corporal's guard. And, second, you can not attack a tangle of goods and services all of which contribute to a final product—the house—by hit-or-miss methods. I am convinced that, if we deal in a coördinated way with the entire fabric of restraints, from the production of materials through to the final work of labor, we can get cheaper houses by freeing the industry. The restraints of trade in building have been so long neglected that they are obvious. Many of them are on the surface. Their unreasonableness requires no elaborate technical learning to demonstrate. We need an organization to proceed simultaneously in as many cities as possible against these restraints wherever they exist. We must attack oppressive local legislation which illegally interferes with interstate commerce. We must attack collusive combinations and boycotts both defensive and aggressive. I am told by a large and very responsible manufacturer of cheap plumbing equipment that it is now impossible for him to sell his product for any construction project of any considerable size. We must free the market for such standardized equipment. It can be done under our present laws.

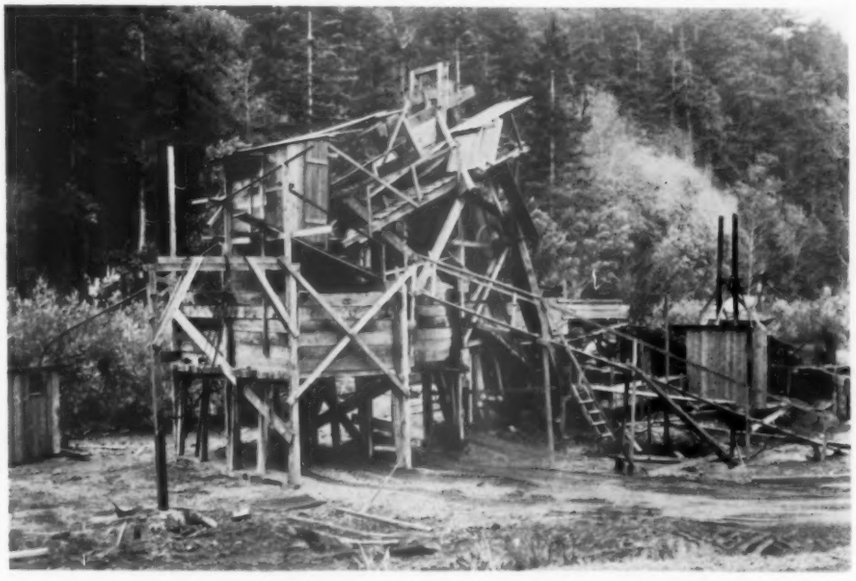
We must use both the civil and criminal processes. The criminal process on a wide scale will protect the law-abiding business man from his aggressive neighbors. The civil process will consolidate those gains.

Mr. Sprague, of the Harvard School of Business Administration, has told me that a concerted drop in prices in the heavy industries would result in increased profits through increased volume. I have talked with some of the leaders in those industries about the possibility. At present, they tell me, no one can obtain any substantial increase in volume by dropping the price of his product because the drop will be absorbed elsewhere in the contractor's profits or in labor's reward. One large manufacturer said, "I am at the mercy of my dealers". Similarly, building-trades labor thinks that to reduce labor costs is not to create more employment, but to enhance the contractor's profit; and contractors see no benefit in reducing their own charges when labor and materials can take up the slack. If we proceed on a broad front we can protect those who see the necessity of a simultaneous price drop. We can open the door for substantial price reductions in the heavy industries. We can carry on the effect of that drop by liberating the real competing contractor. And, finally, we can say to labor, "You can get the same thing that the heavy industries are getting: a greater annual income, though possibly fewer hours of work or lower hourly wages on a particular job". Without such assurance it is certainly not fair to expect labor to take the brunt. It is neither fair nor practical to deal with any element of the situation without dealing with them all.

Finally, government departments must work in coördination. It is not unreasonable to expect that the degree to which government action is offset by private restraint will be taken into account in the further development of the Federal program to promote housing, and that those portions of the industry whose policies are most conducive to large volume may find that volume stimulated by governmental programs.

The problem is not a moral problem. It is silly to denounce those people who are at present struggling in the Augean stables of the building industry. It is the fault of no individual or group that these stables are not clean. Therefore, it will not be solved by preaching nor by writing books. The answer is to take off our coats and go to work.

The Corvallis plant. The ¾-cu.yd. scraper bucket at right is feeding the plant hopper.



Another view of the plant. Variable-speed vibrating screen above.

Temporary Gravel Plants Aid Oregon Producer on Road Jobs

THE Corvallis Sand & Gravel Co., Corvallis, Ore., has demonstrated over a period of many years, the practicability of operating temporary plants to supplement a permanent operation. The company was formed over 30 years ago by J. H. Gallagher, then a contractor and now president of the company, and a plant at Corvallis was built to fill a 300,000-cu.yd. ballast contract for the Southern Pacific Rwy. After completion of this contract the plant became a commercial operation and, with occasional improvements, has continued in this field.

About 13 years ago the company expanded its activities by taking highway contracts and supplying the required aggregates from temporary plants. Aggregates for nearly 200 mi. of state highways in the state of Oregon have been supplied in this manner.

An illustration of the company's methods is afforded by one of the largest contracts undertaken which was recently completed. The contract called for 17,000 cu.yd. of sand and gravel to improve a 40-mi. stretch of U. S. Highway 101, the road extending the entire length of the Pacific Coast from Canada to Mexico. This 40-mi. section extended from a point 15 mi. north of the California state line almost to Port Orford, Ore.

The material for the southern half of this project was supplied from the original plant set-up at Pistol River. The northern half was supplied from a deposit in the Humbug Mountain State Park, 5 mi. south of Port Orford. The deposit was in the bed of Brush Creek a short distance from the ocean and in excavating the material a lake was created which is being developed for recreational purposes.

Material was obtained with a ¾-cu.yd. Sauerman Crescent scraper driven from the motor of a 7-ton Mack truck. A chain connected the rear axle of the truck to the scraper hoist. The sand and gravel were discharged into a hopper from which a reciprocating feeder supplied a 24-in. by 55-ft. belt-conveyor. Preliminary sizing was done by a 3-ft. by 10-ft. Austin-Western revolving screen with a ¼-in. sand jacket. The sand was wasted and was flumed back into the creek downstream from the pit. Other sizes produced were ¼-in. to ¾-in., ¾-in. to 2 in., and oversize.

The oversize went to a 10-in. by 20-in. Wheeling jaw crusher and the ¾-in. to 2-in. gravel to a 28-in. Traylor gyratory crusher. The products of both crushers and the ¼-in. to ¾-in. material were elevated to a 4-ft. by 10-ft. 3-deck Buffalo Niagara vibrating screen equipped with washing sprays. The plus ¾-in. material retained on the top deck was returned to the gyratory crusher for further reduction. The ¼-in. to ½-in., and ½-in. to ¾-in. sizes dropped directly into bins. The minus ¼-in. material created in crushing went to an Allen cone and thence into a bin. Three bins, each of 30-cu.yd. capacity, were used for loading trucks. The plant had a capacity of from 200 to 240 cu.yd. in an 8-hr. day.

A 6-cyl. International PD80 Diesel engine, rated at 80 to 100 hp., drove the gyratory crusher, the elevator and the vibrating screen. An International PD40 Diesel engine, rated at 40 to 50 hp., drove the jaw crusher, the feeder, the belt-conveyor and the revolving screen. The large engine consumed 2½ gal. and the small engine 1½ gal. of 7-cent Diesel fuel oil per hour. Scandia flat belt drives were used exclusively and Scandia elevator belting was also used.

An interesting feature of this plant was the variable-speed drive of the vibrating screen. According to Mr. Gallagher, the state requires adherence to within 10 per cent. above or below the specified sizes, a difficult problem because of the variations in gradation of

(*Continued on page 48*)

By T. N. HAFFNER
Superintendent, Keystone Portland Cement Co., Bath, Pa.

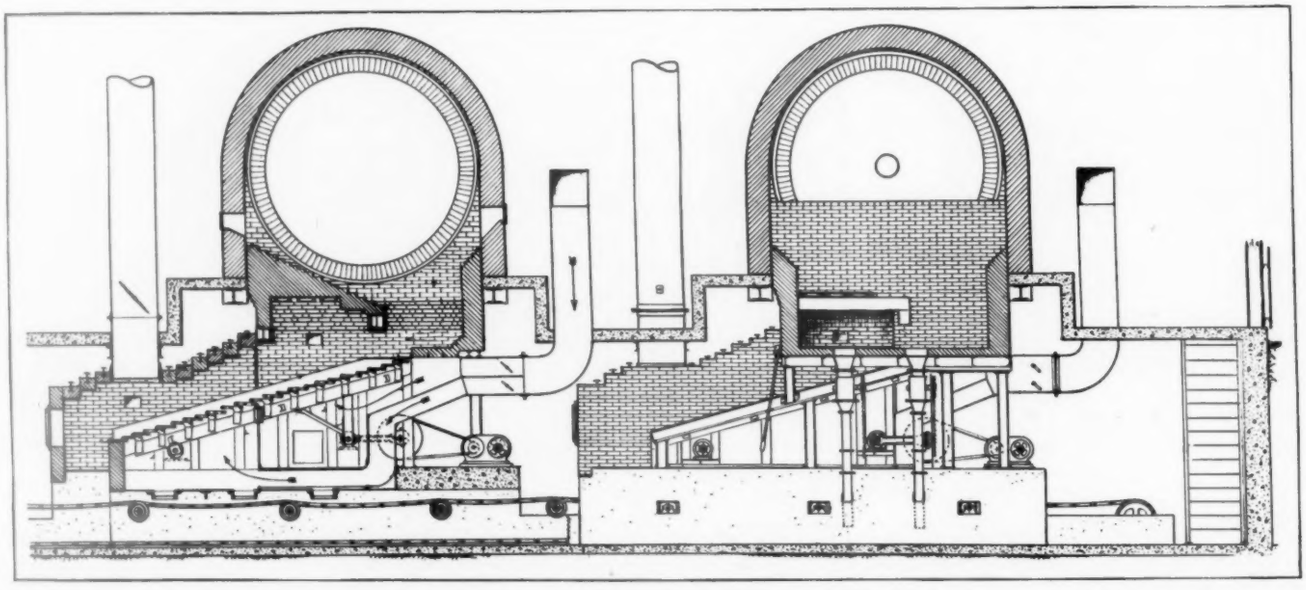
Performance Rises, Up-Keep Declines After Clinker-Cooler Installation

THE first of two Fuller cement-clinker coolers was put in operation at the plant of the Keystone Portland Cement Co. at Bath, Pa., on February 17, the second following just one month later. Five months' operation has proved the success of this installation and it is now possible to draw some conclusions from its performance.

It became obvious several years ago that, while the original Polysius type coolers were doing a pretty good job of cooling, they could not be used economically much longer. This type of cooler is contained in an extension of the kiln shell and consists of, first, a number of lifting angles which take the clinker as it leaves the burning zone and tumbles it through the incoming combustion air; second, an inner shell with lifting plates between the inner and outer shells which further expose the clinker to the incoming air; and, third, a number of chains between the inner and outer shells and attached to the lifting plates. The chains alternately lie in the hot clinker and hang in the incoming air. A very large part of the cooler material was necessarily made of high-grade chrome-nickel steel for heat resistance. So long as this material could be purchased at 25 cents per pound the cooling cost was not excessive, but when the price of heat-resisting metals rose to 45 cents a pound and over, the cooling cost became too large a part of the total clinker cost. It was finally determined that after the coolers were well worn, which would be after the seasonal rush of 1938, the installation of new coolers would be undertaken.

Just a little prior to this time the Fuller Co. put on the market a new cooler, which had been developed at the Valley Forge Cement Co. plant at Conshohocken, Pa., the home of the Breerwood Separation Process for cement raw material. One of the claims for the new cooler was that no heat-resisting metal whatever was used in its construction. After the many tons of metal bought at $500 per ton and more for our original coolers, this was an inducement not to be ignored. A very strong additional inducement was the small size of the cooler, so small that it could be installed in the tunnel hous-

Discharge end of cooler, with clinker drag-conveyor in foreground.



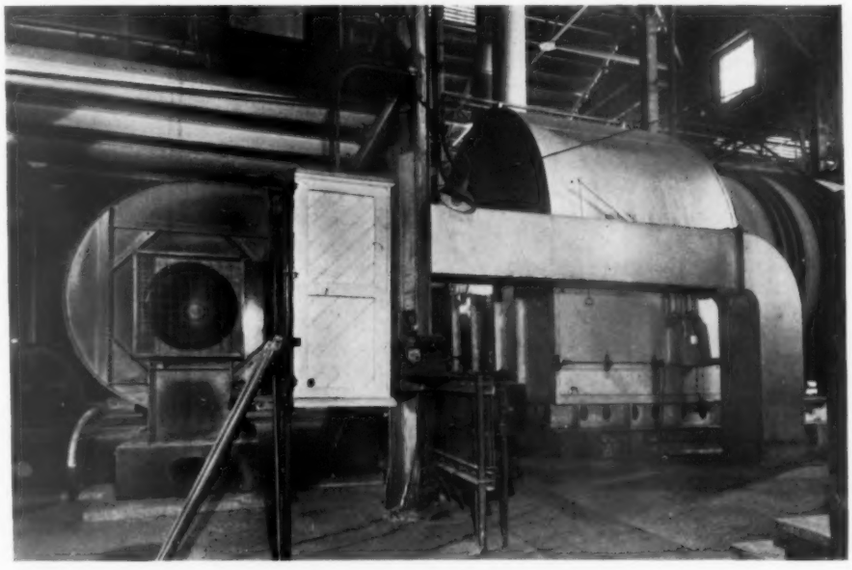
Sketch showing two coolers installed at right angles to cement kilns, each of 1800-bbl. capacity. The air from the recuperator section is used as preheated combustion air and that from the final cooling section is vented to the atmosphere.

ing the drag-chain for carrying the clinker from the kilns. The mechanism appeared simple and not likely to require much attention. Finally, the manufacturer promised rapid quenching of the hot clinker, resulting in low autoclave expansion of the finished cement, which was being increasingly stressed by prominent purchasers. After much investigation and thorough discussion H. H. Leh, our general operating manager, determined upon the purchase of two machines of this make.

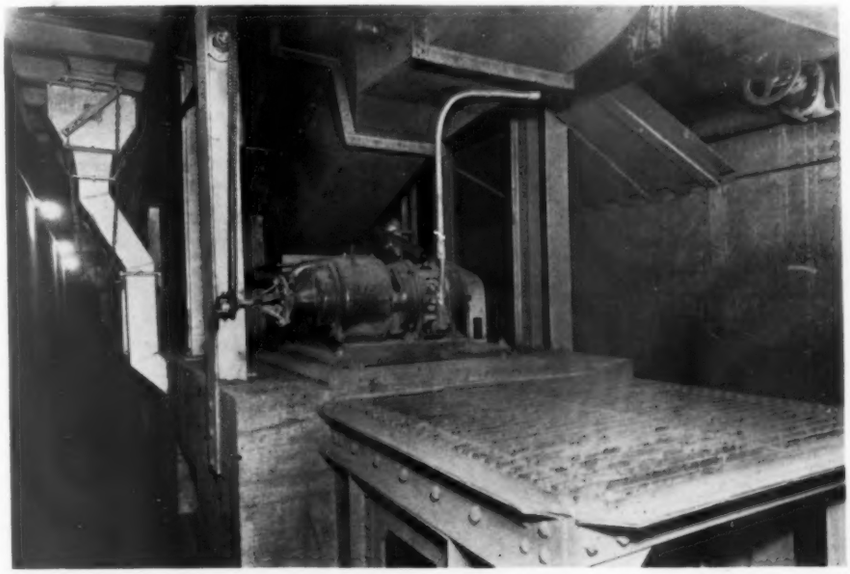
The general features of the installation were developed by the Fuller Co. in conjunction with Mr. Leh and are shown in the accompanying drawing. The cooler proper consists of a number of special-composition cast-iron shelves with a pipe to carry cooling water cast into each shelf, and with round holes or slots for the incoming cooling air to pass through into the clinker bed which lies on the shelves. Alternate shelves are bolted to heavy cast-iron side members, with moving shelves (between the fixed shelves) attached to a structural frame which is moved back and forth about 3 in. by a simple mechanism operated by a 3-hp. motor. The general surface formed by the shelves inclines about 15 deg. to the horizontal and the clinker flows smoothly down this surface as the movable shelves reciprocate. About 17,000 cu.ft. of air per min. at 8 in. of water pressure (furnished by a Clarage fan) is blown between the shelves and through the holes in the shelves and up through the 8-in. to 10-in. clinker bed. The clinker falls from the kiln on the pile of clinker lying on the top stationary shelf, the action of the cooler then causing it to flow in a smooth uniform bed over the shelves and finally drop off to the drag-chain conveyor which lies lengthwise under the cooler. A relief stack near the lower part of the cooler vents part of the air which has passed through the clinker bed to the atmosphere as, in common with most other coolers, somewhat more air is required for cooling than for combustion.

A massive hood of good appearance, made of thick plates to keep its shape and thoroughly welded throughout, houses the end of the kiln and delivers the hot clinker to the cooler and the heated air to the kiln. A wall at right angles to the axis of the kiln extends from side to side of the hood, the clinker falling directly into the cooler, but the heated air is delivered from the side of the cooler to the front compartment of the hood formed by this wall. Provision for expansion due to heat consists of large holes for the foundation bolts on the front of the hood and a special expansion joint on the back of the hood where the kiln enters. This latter provision has proved very useful

Kiln hood, with vent stack and coal feeder.



Another view of kiln hood, with cooler air fan.



Rear end of cooler showing drive.

in preventing cracks in the brick ring around the kiln. The hood is lined with 12½ in. of fire brick, the firewall and the front face consisting of 70-per cent. alumina brick and the remainder of first-class fire brick. Clean-out doors on each side of the hood are made somewhat like open-hearth doors in steel plants, sliding up and down, so the heated face is not presented to the man who may have to work in front of it when opened. Twenty-four inches of the end of the kiln shell is made of heat-resisting plate, this part not being subject to wear.

The coal-feeding arrangement has been changed very little from the original installation. A water-cooled coal tip has been added, which can be moved in and out about 3 ft. and also rotated. A movable tip would not ordinarily be installed, but it seemed desirable to keep this feature as it was already in satisfactory operation. A Norblo fan delivering about 20 per cent. of the required air for combustion carries the coal from the feeder to the point of combustion at 12 in. of water pressure.

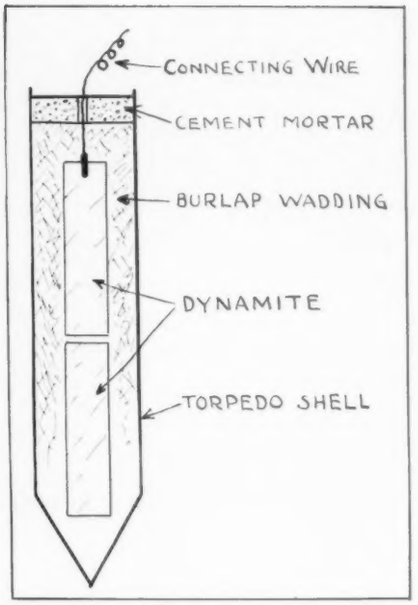
The results have exceeded expectation. The clinker drops from the kiln at a temperature of about 2,400 deg. F. and leaves the cooler at about 350 deg. F. This was below the anticipated temperature, as the coolers were intended for primary cooling.

The autoclave expansion has been reduced to 0.25 per cent. and down as low as 0.15 per cent. The coal consumption has decreased slightly, but these coolers replace coolers that were highly efficient in this respect. To date there has been no increase in grindability, nor increase in production, probably due to using the cooling section of the original kiln as the new burning zone, which decreased the burning zone from 156 to 140 in. in diameter. If it had been practical to increase the new burning zone to the same size as the old burning zone, the output would undoubtedly have increased 20 per cent. Only a relatively small amount of heat-resisting steel has been used in the kiln end and none in the cooler, where it is subject to wear.

It seems certain that the up-keep on these coolers will be very much less than on the original coolers, and in these days of passed dividends this is no small matter.

Torpedoes Aid Washing of River-Bed Gravel

In the construction of a dam in a reclamation project near McConnelsville, O., it became necessary to use gravel from the bed of Wolf River, a nearby stream. After dredging was started, however, the product was condemned because of its being mixed



with coal, sand, and similar residue. Due to a low water stage and resultant slow current, the usual cleaning methods failed to work. After some costly experimenting and delay, H. K. Berry, contractor in charge, suggested the use of dynamite.

Several sections of iron pipe 2 in. in diameter and 24 in. in length were brought to the job. One end of each pipe was cut to form four gores which were welded into a point, and the shells thus made were loaded with two 1¼-in. by 8-in. cartridges of 40-per cent. ammonia dynamite. Cartridges were placed end to end and in the top cartridge was inserted a No. 6 electric blasting cap which was attached to a 12-ft. length of insulated copper wire. All connections were taped and burlap wadding was tamped into the shell to hold the cartridges in place. The pipe was then filled to within an inch of the top with cement mortar.

By means of a boat the torpedoes were taken over the bed of the river and pushed point downward with pike-poles into the gravel bed. Pressure was applied until the top of the shell was submerged in the gravel. Shells were placed 10 ft. apart each way and after six shells had been thus placed, the wires were connected and fired in a series from a battery on the shore.

The action of the blast was two-fold. First, lifting the spoil so that water could circulate freely through it. Second, agitating the current so that much of the residue, being lighter than gravel, could be washed out. The result was a top layer of gravel almost entirely free of undesirable material. When this layer, which had an average depth of 8 in., had been stripped off the shooting was resumed in the same manner and so carried out until the project was completed.

Torpedoes for the purpose were made at an average cost of 72c. each and it required one hour's time and the labor of three men to place and fire a series of blasts. This made a net cost of 1½c. per cu.yd. for cleaning the gravel, which was ½c. less than that of the unsuccessful methods previously tried. It was also found that the torpedo method of gravel cleaning could be carried out on small streams where it was impossible to erect washing equipment and that it worked equally well at either high- or low-water stage.

Corvallis (from page 45)

the available deposits. Variable speed control, he said, made it possible to keep the product well within the specified limits while keeping waste at the minimum. The screen was designed for a speed of 1,200 r.p.m. but was actually operated at various speeds from

The 80-hp. and 40-hp. Diesel engines which drive all equipment in the plant.

900 up to 1,250 r.p.m. as conditions demanded. The use of a Reeves variable-speed-reduction unit on the screen drive made accurate speed control possible.

Ernest A. Dunbar, for many years assistant West coast manager for the Taylor-Wharton Iron & Steel Co., has resigned to accept the position as assistant resident manager of the Yukon-Pacific Co. He will be located at the company operations at Kuala Lumpur, F. M. S.

To Make Cement from Oil Shale in Germany

Cement is to be manufactured at a new plant in Wurttemberg, Germany, which will utilize oil-shale coke, the Bureau of Mines reports.

The new plant will produce oil-shale coke and then process the material with limestone into a special high-grade cement with unusual qualities of bending strength and impact resistance. This new field of utilization, which has been developed for the extensive deposits of oil shale, will yield also, as separate by-products, shale oil and the sulfur constituents of the oil shale.

By DR. GABRIEL ASHKENAZI

The Construction Industry's Demands from a Cement-Chemist's Viewpoint

THE uses of cement concrete are extensive and manifold. Naturally, cement manufacturers exerted themselves to produce a material complying with the requirements covering its various applications. Cement users demanded certain properties. Some of their demands were justified and promoted considerable improvement in plant equipment, as well as in the process of manufacuring. Some of them were unfounded, or could not be met. In consequence of this the industrial cement chemist, attempting to meet diverse requirements, faced many difficulties.

Differences in the application of concrete resulted in an immense amount of research being carried out. Many of the numerous experimental data, however, are of somewhat fragmentary character. We have excellent research on different phenomena, such as bond, creep, elasticity and shrinkage. In connection with the use of concrete for mass construction, comprehensive studies on the thermal properties of concrete have been made in this country. Until now, however, only a few attempts have been made to consolidate the accumulated material into a leading theory. And until now there has still emerged no theory which accounts for all these phenomena, nor do we possess a clear conception of the structure of concrete.

The present writer, an industrial cement chemist, sometimes felt puzzled when trying to satisfy the requirements of construction practice. Trying to understand some of the failures attributed by the concrete contractor to the properties of the cement used, he has also been puzzled because, according to his best knowledge, the defects in question could not be ascribed to the cement. In such cases he attempted to stress the fact that cement does not present the only factor affecting the general properties of concrete. He pointed out that in some of the cases the cement may not be the major factor at all. As a matter of fact, to mention one example, the cracks in concrete, attributed to the heat of hydration generated by cement, can occur also when low-heat cement has been used, being induced by an unfavorable relation of the placing temperature to the stable temperature.

Different factors play an important *rôle* in developing concrete properties and this fact has been strongly emphasized by the authorities on concrete. These factors, including climatic conditions, method of construction (rate, mixing and placing), character of foundation, composition of the mixture, represent, strictly speaking, the external conditions which promote or hinder the development of the binding properties of cement. Of course, the practical value of concrete depends ultimately on the hydraulic properties of the cement, *i.e.,* on its ability, after being mixed with water, to harden and to cohere into a seemingly solid stone-like structure.

The hardening process of cement presents a complicated phenomenon, the nature of which is still insufficiently explained. The opposed views fluctuate between the colloid and the crystal theory of hardening. The partisans of the colloid theory point out that the crystal theory is not consonant with the particular properties of set cement, and that the behavior of concrete can be better understood and explained when accepting the colloid theory of hardening. Besides, the microscopic examination of set cement does not show the presence of crystals. Prof. H. Kühl, who for many years sought to discover crystalline formations in thin sections of set cement, failed to achieve this object. Even twenty-year-old thin sections did not show any crystals.[1] A considerable part of investigators, however, believe the process of setting and hardening to be the result of colloid and crystal formations. The recently published studies on the hydration of cement by Dr. Lennart Forsén indicate that the silicate compounds formed during this process are sub-microcrystalline.[2]

The fact that the first reaction of cement on hydration results in the formation of colloids is indisputable. This fact, however, does not exclude the possibility that in time the colloid mass may be converted into meta-colloidal, or even ultra-microcrystalline form, the presence of which is difficult to establish by means of simple microscopic examination.

One of the most frequent problems which the cement chemist has to face, while meeting the requirements of the contractor, is the phenomenon of shrinkage. From a practical point of view it may not be of great importance whether we explain this shrinkage as the result of crystalline hydrate formation connected with a decrease of volume, or as the result of so-called "internal absorption," according to the colloid theory of hardening, or as the effect of both phenomena. Cement shrinkage lies in the nature of hydraulic hardening; the construction engineer, however, considers this phenomenon an undesirable element.

Gel is produced during the setting of cement and the density of this gel depends on its water content. The ability to imbibe varying amounts of water is a characteristic property of all gels. It has been proved that silica forms hydrogels containing as much as 330 mol. of water to 1 mol. of silica.[3] The amount of water can vary considerably, but it is obvious that cement-gels can hold a limited quantity of water. According to R. W. Carlson, "for a given gel there is an equilibrium water content and corresponding volume for each atmospheric humidity to which it may be exposed."

On the other hand a colloidal state presupposes the minimum amount of water. A decrease of water below this minimum destroys the colloidal structure which can not be reëstablished by the mechanical addition of more water. The cement gel, dried to such a point, can not be revived. When such a desiccation occurs in the early stage of hardening process, a weak gel is produced. The loss of water causes a considerable shrinkage and, as the weak gel structure can not withstand the stress caused by this shrinkage, the concrete cracks. It is known that the cement grain hydrates gradually. It has been proved that the depth of penetration of water into a cement grain, surrounded by water during a period of 28 days, does not exceed a few thousandths of a millimeter.[4] The action of water on the surface of the cement grain produces a colloid mass; subsequently the adjoined part of cement grain withdraws water from the primarily formed gel (internal absorption), producing new masses of gel. The gel complex contracts, its density increases, augmenting its elasticity, as well as its resistance. Thus, the normal shrinkage, due to the normal hardening, is harmless to concrete; its rate corresponds to the quantity and quality of forming gel and the internal stresses produced by this shrinkage are compensated by the stability and cohesion of the condensed colloidal cell.

The shrinkage of concrete and mortar is caused, however, not only by the normal contraction of the hardening

gel. The often-expressed view that the rate of shrinkage in mortar and concrete depends on the proportion of cement are not quite correct. It has been shown, indeed, that the rate of shrinkage diminishes with the decrease of the content of cement, but this decrease has been far less than the reduced proportion of cement. Actually, other factors influence the shrinkage of concrete, and under certain conditions their influence may become harmful to the durability of the construction. We are referring to shrinkage due to the desiccation of the gel by the loss of its imbibed water to the air, as well as to the shrinkage due to the thermal effects.

Generally, gel shrinks while drying and swells on wetting. This is true with respect to gelatine, for instance, which shows such a reversible course of volume change. As to the cement gel this assertion can not be accepted without reservation. If silica gel is dried far enough, pores are formed and it loses its adsorptive ability.[5] The reason for this behavior is not known. It is possible that the drying out of silica gel changes its physical state from colloidal into sub-microcrystalline and that this change lowers its ability to swell. The cement gel, composed chiefly of calcium hydrosilicates, is still less able to exhibit such a reversible reaction. R. W. Carlson showed that artificially-dried 1.5-in. to 12-in. bars of cement mortar, after a following treatment with water, not only regained the loss by shrinkage, but even increased their original length. We are, however, of the opinion that the regaining of lost volume observed by Carlson is due, not to the swelling of dried-out old gels, but to a new hydration of still-unhydrated cement parts, which filled the pores of the dried-out mass with new colloid formations, a process similar to the well-known phenomenon of self-healing.

The danger of desiccation was practically established long ago, long before the elements of the knowledge of concrete had been worked out. This danger was apparently one of the reasons why it is customary to work with very wet mixtures, using a great excess of mixing water. The excess of mixing water is, however, unfavorable to the development of strength and, in addition, may be injurious to the durability of concrete. According to Duff A. Abrams, a concrete made of a mix with a water-cement ratio of 0.70 develops at 7 days the same strength as one with a ratio of 1.00 at 90 days.[6]

A drier mix produces initially a rich, elastic and strong gel, holding firmly the absorbed water. The wet mix forms an overexpanded gel, diluted with water. The strengths are low, but in time, by producing more gel from the unattacked part of cement grain and by the loss of water due to the slow natural evaporation, it may, if the curing conditions are favorable, attain the state of a drier mix. This fact is the main reason why the specimens made of a wet mixture, when tested in materials laboratories, show satisfactory results after a longer period of curing. In practice, however, the curing conditions are less favorable and the opinion has been expressed that many structures made of concrete mixed with an excess of water, which "are apparently in good conditions, will be found to be below the safety limit." [7]

Theoretically, the hydration of cement requires little water. According to R. W. Carlson, "the water needed for chemical combinations is about 10 per cent. of the weight of cement, but for the production of gel at least three times as much is needed." [8] Considering the fact that, even at the age of 28 days only a little part of cement in concrete is hydrated, the amount of water actually needed may be considerably smaller. It is true, the process of hydration may go on for a very long time, but, normally, the bulk of the hardening power is already produced at the early ages and the following development proceeds very slowly. Inasmuch as the amount of mixing water usually fluctuates between 50 and 80 per cent. of the weight of the cement, the concrete produced always contains an excess of water. Even the most carefully prepared concrete contains hollow places. This fact makes it possible for the excess of water to flow in the mass of concrete. Different external effects promote this movement of water. Accumulated in the macropores it may expand at lower temperature and produce rupture in the adjoining cells of cement-gel, damaging the colloid structure and creating new weak points in the construction.

The dangers of over-wet mixtures have been frequently discussed in the literature; nevertheless, the contractor prefers to work with an excess of mixing water. The existence of free water in concrete may be the cause of other deteriorations. Uncombined water, slowly but steadily flowing through the capillary channels, may dissolve the CO_2 which is diffused from the atmosphere in the capillaries. Normally, carbon dioxide diffused from the atmosphere into the concrete transforms the calcium hydroxide released during the hydration of cement into calcium carbonate. The latter is practically insoluble in water and, unlike calcium hydroxide, can not be washed out from the concrete. The presence of free water, however, hinders the solidifying action of the CO_2. Carbon dioxide containing water dissolves the calcium carbonate produced, as well as the calcium hydroxide precipitated on the walls of the pores and capillaries, and the dissolved compounds may be carried out to the exterior, thus weakening the skeleton of the construction. In addition, the enlarged voids create new possibilities for the flow of water. The water movement in concrete produces a shrinkage which can result in important deformations. Other phenomena, such as the segregation of water from the paste,[9] as well as the seepage of colloid water from the cement gel,[10] are also caused by an excess of mixing water. Cracks in concrete, which so often are attributed to the properties of cements, actually are caused by the use of an over-wet mixture.

Another problem which is subjected to frequent and protracted discussions between the industrial cement chemist and the concrete practitioner comprises the thermal effects. The thermal characteristics of concrete have been attacked from different angles: there exists a voluminous literature on this subject. Very much attention, partly justified, partly undue, has been given to the heat of hydration of cement. The particular demands by the constructor regarding the amount of the heat of hydration sometimes forced the industrial chemist to rack his brain. As a matter of fact, heat of hydration is an inevitable phenomenon; like shrinkage, it lies in the nature of hydraulic hardening. It represents chiefly the heat of hydration and solution of uncombined lime and gypsum and the heat of hydration of the proper constituents of cement. The presence of uncombined lime in a correctly prepared cement is excluded; the hydrolysis of the proper constituents is the preliminary condition of hardening. Less heat of hydration means fewer hydration products, fewer colloidal matters, and a weak gel diluted with water.

Even for special construction, such as mass concrete, construction practice should not hesitate to use cement developing high strength at early ages. The writer prefers a lower content of high-strength cement to a higher content of a low-heat cement of poor strength. Disregarding this opinion, it is to be pointed out that the heat of hydration is not the major factor affecting the thermal properties of concrete. The more important factors comprise the relation between the placing and stable temperatures, the methods of construction, and the exposure conditions. It is absolutely insufficient to reduce the heat of hydration; it is far more important to create an easy way to remove the produced heat from the huge mass of concrete, because ultimately the temperature rise of concrete made of low-heat cement is not much lower than that of one made of standard cement.[11]

The construction engineer is used to approaching his problems mathematically. It is self-evident that mathematical forms have been applied to the thermal phenomena in concrete. Certain problems could find a satisfactory solution. All in all, however, the question presents the most complicated chapter in the book of knowledge about the physical nature of concrete. At the First International Congress for Concrete the well-known French engineer, E. Freyssinet, stressed the fact that it is very difficult, if not impossible, to determine the correct coëfficient of thermal expansion of concrete, pointing out that stresses generally ascribed to temperature changes are due to the changes in the hydrometric state of the air.

Our conception of concrete is far from being complete, but it is generally agreed that set mortars and concrete are capillary systems. According to Freyssinet,[12] concrete is a pseudo-solid substance, a material which seems externally to be solid, but in fact presents a network of interstices, more or less capillary, containing water or air. This net separates in many parts the really solid ingredients of concrete which form a skeleton of it. Under the influence of different agents the interstices may be filled or emptied. For every constant temperature there exists an equilibrium depending upon the humidity. A complex of strength is produced directed from the exterior to the interior (shrinkage), the pressure of which may result in important deformations. A direct relation exists between the capillary diameters, the hydrometric state of the air, and the tension on the capillary walls, as well as between this capillary tension and the phenomena of shrinkage, plastic flow and thermal expansion. Freyssinet's theory of concrete presents a remarkable attempt to explain and to link together many phenomena. The present writer wishes to point out that this theory does not consider at all the gradual hydration of cement and that Freyssinet's explanation of shrinkage and creep as a result of variations in the pressure of water contained in the capillaries is open to serious objections. In any case his conception emphasizes the very complicated nature of the movements in concrete.

It is beyond the scope of this article to delve deeply into the subject of the physical constitution of cement concrete. The writer has attempted to show that it is often preposterous to correlate certain properties of cement, such as thermal expansion, heat of hydration, and shrinkage, to similar phenomena in concrete. Of course, these cement properties influence the behavior of mortar and concrete, but this influence is usually exaggerated by the average structural engineer.

It has been indicated that the natural contraction of cement gel in the process of hardening plays a relatively minor *rôle* in the movements in concrete. The heat generated by cement on hydration is far less important for the thermal effects in concrete than the other factors, such as the exposure conditions, methods of construction, and, in the case of mass concrete, the rate of the dissipation of heat.

In conclusion the writer wishes to devote a few words to the question of the composition of Portland cement in connection with its properties. The concrete experts became accustomed to determining the expected properties of cement by taking into account the properties of individual compounds, such as C_3S, C_2S, C_3A, C_4AF, which assumedly comprise the most essential constituents of cement. Inasmuch as we do not possess a method for the direct estimation of the amount of these compounds in cement, their proportions are determined indirectly by the calculation from the oxides composition of cement, as given by its chemical analyses. In the opinion of the majority of constructors a certain amount of so-established compounds, those of C_3S and, especially, C_3A, is undesirable and may be injurious for the construction. This opinion led to specifications limiting the percentage of these computed compounds in cement. This writer was always against such a regulation, and on other occasions he has expressed already a more detailed opinion on this subject. At the present, suffice it to say the following: Although the composition of Portland cement lies within certain limits, large fluctuations in the relationship of oxides are admissible. Strict general limitation to the contents of the principal oxides can not be justified by the present state of our knowledge. Even less is limiting the percentage of the computed compounds admissible, because the existence of some of these compounds in cement in the form of crystalline individuals is not sufficiently proved. Apart from this consideration, the behavior of the laboratory-prepared p u r e crystalline compounds gives us no right to assume that they will behave in the same way in a complex combination such as Portland cement. Besides, it has been established that these compounds exist in commercial cements not in the form of crystalline individuals, but partly in the state of solid solutions. Further, the presence of the so-much-discussed tricalcium-aluminate, even in cases where, according to the usual methods of calculation, its percentage was sufficient to be experimentally established, could not be detected either by means of the metallographic method,[13] or by petrographic examinations.[14] In spite of these facts the tendency toward limiting certain computed compounds still exists in this country. This tendency is unconsonant with the results of theoretical researches, as well as with industrial practice. During his long years of experience this writer produced excellent cements with a content of more than 10 per cent. of computed C_3A and very poor brands whose contents of this compound were less than 7 per cent. [The proportions of other computed compounds, excepting C_4AF, of course, as well as the manufacturing conditions were practically unchanged.] The most favorable composition ultimately depends on the nature of the raw materials and the manufacturing conditions only. Specifications leading to vigorous regulation as to the compounds composition of cement are handicapping the normal course of manufacture. In order to avoid a misunderstanding, however, the writer wishes to say that it is necessary, and absolutely within the rights of customers, to specify the general properties of cement, such as the resistance, setting time, heat of hydration, soundness, shrinkage, etc. Requirements connected with the chemical composition, especially those limiting the proportions of "computed compounds," are inadmissible. The producer himself will determine the right way and the suitable mixture in order to make a product having the required properties.

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Personal Mention

EUGENE D. HILL, formerly vice-president, has been made president of the Louisville Cement Co., succeeding WILLIAM S. SPEED who becomes chairman of the board. HARRY D. BAYLOR, another vice-president, has been elevated to the presidency of Louisville's subsidiary, the Louisville Cement Co. of New York, maker of Brixment.

OSCAR MILLER, of Pateros, Wash., has sold his lime-marl deposit near Alta Lake to Robert and K. O. Wadsworth.

D. A. MCKINNON, engineer of the Montana Highway Department, is testing the use of decomposed sandstone in constructing oiled highways, on a three-mile strip near Jordan, Mont.

JOHN C. GRABER, of Freeman, S. D., has been appointed a member of the South Dakota State Cement Commission to replace Tom H. Johnston, of Rapid City, S. D. Mr. Graber's term will expire July 1, 1943.

BEN W. CALVIN has been elected president of the Aetna Portland Cement Co., Bay City, Mich., to succeed the late Franklin R. Johnson who died July 19. Mr. Calvin has been vice-president and general manager of the company and is a well known figure in the cement industry.

GEORGE S. NEEL has been appointed sales manager for the Chicago area by the Universal Atlas Cement Co., with J. J. BERSCHEID as his assistant. Mr. Neel has been with the company for 20 years having been located in St. Louis, Kansas City and Des Moines. Mr. Berscheid has been in the Chicago sales office for 10 years.

AMELIO COLESANTI, East Weymouth, Mass., sand-and-gravel operator, was trapped in a loader chute and barely saved from burial alive in a sand-slide recently. He was taken to a hospital for treatment for severe bruises. Six months ago his son, Amelio, Jr., 13, was crushed to death between a loader and a truck at the same spot.

RALPH ROGERS and FRANK DOBSON have established a crushed-stone plant near Bloomington, Ind., with a capacity of 500 cu.yd. per day.

M. S. LAMBERT has been named vice-president and general manager of the Hewitt Rubber Co. of Pittsburgh, Pa.

JACK B. HAILE, manager of the road machinery division of Gar Wood Industries, Inc., has announced the appointment of DUKE KERRICK as field representative. Mr. Kerrick was formerly connected with the Continental Roll & Steel Foundry Co. of East Chicago, Ind. Continental's tractor-equipment division was recently acquired by Gar Wood Industries.

FREDERICK W. OHLEMACHER, 68, vice-president of the Kelley Island Lime & Transport Co., Cleveland, O., died at his home in Sandusky, O., on August 1. He had been connected with the company for 36 years. His father was one of the pioneers in the Ohio lime industry.

HOMER A. SCHOLZE, 66, vice-president of the Union Sand & Gravel Co., Huntington, W. Va., died at a Gallipolis, O., hospital recently following a brief illness. Burial was at Louisa, Ky.

CARL LAGER, president of the Morris Machine Works, Baldwinsville, N. Y., passed away July 17. He had been with the company for nearly 50 years.

REUBEN W. EBERLY, 60, former president of the Buffalo Gravel Corp., Buffalo, N. Y., died recently after an extended illness.

Traffic News Digest

LEGISLATION

The only transportation legislation of any importance that passed the recent session of Congress was that relating to reorganization of railroads. This particularly benefited the B. & O. Railroad and some other carriers that are in the process of reorganization.

Transportation Act — As predicted in the last issue of PIT AND QUARRY, the House bill as outlined in that issue with some minor amendments was passed by the House and sent to a conference between the House and the Senate but was not finally acted upon. One amendment bars the Commission from approving consolidations or merger of railroads if labor were displaced thereby. This practically nullifies consolidations for if only one employee were dismissed by such consolidation the Commission could not approve it. The part of the House bill which was subject to the most controversy was that part providing for Commission regulation of water carriers. A motion to strike out this provision was defeated by a vote of 167 to 144. The bill was introduced in the House as S. bill 2,009. While it was entirely different in many respects from the bill as passed by the Senate it is considered as an amendment to that bill. The bill was passed by the House on July 26 and on the 27th the Senate conferees were appointed to meet with House conferees to adjust differences in the two bills. Senate conferees are: Senator Wheeler, Chairman of the Interstate Commerce Committee and Senators, Truman, Donahey, White and Reed. The House conferees are: Chairman Lea, Representatives, Crosser of Ohio, Bulwinkle of North Carolina, Cole of Maryland, Wolverton of New Jersey, Holmes of Massachusetts and Halleck of Indiana. The Senate and House conferees met on August 4 and decided that they would begin deliberation shortly after the first of December and try to have a report ready for consideration of Congress early in January.

Postalization of Fares—The resolution directing the Commission to make an investigation of the Hastings plan for Postalization of rates and fares was modified by eliminating the word directing and by nearly authorizing the Commission to make such an investigation and by eliminating an appropriation of $25,000 to carry on the investigation.

Why cost-minded producers are installing *Simplicity* gyrating screens

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The resolution was further modified to provide for an investigation of passenger fares only and not freight rates. The modified resolution was passed by the Senate on August 1 and sent to the House, but it was not considered at the recent session.

RECENT I. C. C. DECISIONS

Amisite — The Commission has awarded reparation amounting to $41.00 with interest on finding that the charges collected on shipments of processed asphaltic sandstone from Bowling Green, Ky. to Harrisburg, Pa. were unreasonable. The charges were collected on the basis of 90 per cent. of the marked capacity of the car furnished at the carriers convenience. Shippers ordered cars of 80,000 pounds capacity and carriers furnished cars of 100,000 pounds capacity. The Commission found that the defendants' failure to publish a rule to the effect that when a car of the capacity ordered by the shipper could not be promptly furnished and when the carrier for its own convenience provided a car of greater capacity such car might be used on the basis of the minimum carload fixed in the tariff for cars of the capacity ordered by the shipper. I. C. C. docket No. 28,084, Kentucky Rock Asphalt Co., Inc. *v.* L. & N. *et al.*

Cement—In response to fourth section application No. 17,350, the Commission has granted permanent fourth section relief on old used cement bags in less than carloads from various destinations in the west and returned to Rapid City, S. D., in fourth section order No. 13,504.

Sand—The Commission has found the carload rate charged on sand from Talbird Siding, N. C., to Lynchburg, Va., of a $1.45 a net ton inapplicable and that the applicable rate was a combination amounting to $2.20. It has further found that the applicable rate was unreasonable to the extent it exceeded a $1.70 and defendants have been authorized to waive outstanding undercharges to this basis. I. C. C. docket No. 28,089, Traffic Bureau, Lynchburg Chamber of Commerce *et al. v.* Norfolk & Western *et al.*

Sand and Gravel — Applicants in fourth-section applications No. 17,420 and 17,441 have been authorized to establish and maintain rates on sand and gravel from Janesville, Wis., and South Beloit, Ill., to Northfield, Ill., over their existing routes a rate not lower than 55 cents a net ton, without observing the long-and-short-haul provision of section 4. Relief is to expire on December 27, 1939. Relief was denied on an application to establish and maintain a rate of 55 cents a net ton on sand and gravel from Janesville and Afton, Wis., to Evanston, Ill., on the ground that sufficient justification was not shown. I. C. C. F. S. O. No. 13,497.

Prior findings and orders have been modified to permit the establishment of a single line rate of 61 cents a net ton on sand and gravel from Peru to Valparaiso, Ind., to expire December 31, 1939. I. C. C. docket No. 21,894, Lehigh Stone Co. *v.* B. & O. *et al.*

Split Deliveries—Carriers in the South proposed to establish in connection with the application of all-freight commodity rates, rules governing stoppage of transit to completely load or partially to unload and rules governing split deliveries. This would authorize the sorting of carload freight in packages into several lots for distribution or reforwarding. The rules provided also that when the consignee desired that a portion of the contents of the car be forwarded to points beyond the destination of the carload, such freight when necessary would be transported either in switch service or by truck to the freight station of another carrier without additional charge for the transfer other than the service charge for split-deliveries of 2¾ cents a 100 pounds. It also provided that when a consignee desired one portion of the contents of the car delivered to a private siding by switch service, such switch service should be in addition to the service charge. On petition of The Southern Motor Carriers' Rate Conference these schedules were suspended and the Commission has decided that they were not justified. This, however, is without prejudice to the establishment of rates and rules in conformity with the findings in I. & S. 4,531 follow-lot cars to Texas and in I. & S. 4,315 Middle Atlantic States Motor Carrier Conference, Inc., *v.* C. of N. J. I. C. C. I. & S. docket No. 4,534 Split-Delivery Rules in the South.

EXAMINER'S REPORT

Crushed Stone, Sand and Gravel—Examiner Burton Fuller on further hearing on the rates on crushed stone, sand, gravel and slag moving from points zones I, II and III, in Wisconsin, Illinois, and Indiana to the Chicago-Gary district, proposes the authorization of reduced rates to meet the competition of wayside pits, trucks and water carriers. He proposes that single line rates of 50, 55 and 60 cents a net ton be permitted from the three zones with a differential of 20 cents a ton for connecting line delivery. This would modify a prior report in a number of cases dealing with rates on these materials to the Chicago district. I. C. C. docket No. 17,817 Chicago Gravel Co. *et al. v.* Santa Fe *et al.* and cases joined therewith.

Sand—Examiner John J. Crowley proposes reparation with interest on a finding that the rate of $1.20 a net ton on sand from Polk, Pa., to Erie, Pa., via an interstate route on shipments moving between March 19, 1935, and December 19, 1936, was unreasonable to the extent it exceeded $1.10 a ton. I. C. C. docket No. 28,165, National Erie Corp. *v.* N. Y. C.

Ground Limestone—Examiner Horace W. Johnson on further hearing recommends that the findings in the original report in 152 I. C. C. 429 and 191 I. C. C. 188 prescribing rates on agricultural limestone in carloads from Gibsonburg, O., to destinations in the lower peninsula of Michigan be modified so that for the future rates will be unreasonable to the extent they exceed or may exceed those based on the mileage scale as set forth in appendix in 225 I. C. C. 663 at page 667, subject to increases resulting from the general commodity rate increases of 1937. In all other respects the prior decisions in the cases reheard were proposed to be affirmed. I. C. C. docket 20,039, National Mortar & Supply Co. *v.* Ann Arbor *et al.* also No. 27,472, Sub. No. 1, Same *v.* Pennsylvania *et al.*, and Sub. No. 3, Ohio Hydrate & Supply Co. *v.* Pennsylvania *et al.*

NEW COMPLAINTS FILED

Fluxing Lime—Alleging violations of sections 1 and 3 in connection with the rates and charges on "calsifer," a fluxing material made of ferri-ferous limestone, from Lawrence, O., to destinations in West Virginia, Ohio, Michigan and Pennsylvania, with undue preference alleged for shippers at Martinsburg and Millville, W. Va., reasonable rates and reparation are requested in I. C. C. docket No. 28,303, Ohio Calcium Co., Inc., Lawrence, O., *v.* B. & O. *et al.* The complaint was filed by C. N. Thompson, 312 Kitchen Bldg., Ashland, Ky.

Gypsum — Reasonable rates and reparation are requested on an allegation of violation of sections 1, 3 and 13 in connection with the rate on gypsum from Byron, Nev., to destinations in California with undue preference alleged for competitors in Nevada and California in a complaint filed by Black, Hammack & McWilliams, 900 Spring Arcade Bldg., Los Angeles, Cal., in I. C. C. docket No. 28,296, Monolith Portland Cement Co., Los Angeles, Cal., *v.* Santa Fe *et al.*

Whiting—The Commission has reopened various cases joined in its decision in 231 I. C. C. 755, having to do with the rates on chalk whiting and limestone whiting between points in the east. In this decision the Commission found that the rates on chalk whiting from Camden, N. J., to destinations in official territory would be unreasonable to the extent they might exceed 20 per cent. of the first-class rates based on a carload minimum of 60,000 pounds. The Commission further found that the rates on ground limestone whiting, which was a material made from ground limestone fine enough to pass a 200-mesh screen would be unreasonable to the extent they might exceed 20 per cent. of the first class rates based on the same minimum. This put all whiting regardless of whether made from chalk or limestone on the same basis of 20 per cent. of the first class rate. The Commission now finds that some ground or pulverized limestone, which the Commission designates as limestone whiting has been moving under the description of agricultural limestone on rates as low as 9.5 per cent. of the first class rate. On this account the Commission has reopened the cases joined with I. C. C. docket No. 27,921, Southwark Manufacturing Co. *v.* Pennsylvania-Reading Seashore Lines *et al.*

Classification—On its own motion the Commission has instituted an investigation concerning the description, minima and ratings provided in the consolidated freight classification with a view to determining whether any of them are unjust, unreasonable, unduly prejudicial, unduly preferential or otherwise unlawful and the making of findings and orders as may be proper, in I. C. C. docket No. 28,310 Consolidated Freight Classification.

On its own motion the Commission has instituted an investigation into the description, minimums and ratings of freight classifications of motor common carriers for the transportation of property in interstate or foreign commerce with a view of determining whether they are in anywise unjust or unreasonable, unjustly discriminatory, unduly prejudicial or otherwise unlawful in I. C. C. docket No. MC C-150 Motor Freight Classifications. All interstate motor-freight carriers have been made defendants in this case.

OTHER TRAFFIC NEWS

American Enterprise Association—L. C. Newlands, vice-president of the Oregon Portland Cement Co., Portland, Ore., has been elected a member of the board of directors of the Transportation Assn. of America and its new division, the American Enterprise Assn. The purpose of the association is to work for the maintenance of private ownership of transportation and industry. The American Enterprise Assn. which was formed by the Transportation Assn. of America is a result of the association's four year study of the complicated transport industry in which it becomes increasingly apparent that the problem of maintaining private ownership in this major economic field can not be disassociated or treated separately from trends which threaten to undermine not only transportation, but the whole structure of free enterprise, according to Donald D. Conn, executive vice-president.

Classification Simplification—The Assn. of American Railroads has appointed a Committee consisting of A. H. Greenly, E. H. Dulaney and W. E. Prendergast who have been relieved of all other work so that they may devote their entire time to the simplification of the consolidated classification. This classification is a 500 page book which lists and describes 15,000 different classes into which the commodities are grouped for rail shipment in the United States. It is expected that the work of this committee will result in a large reduction in the number of items, a material simplification in the rules and regu-

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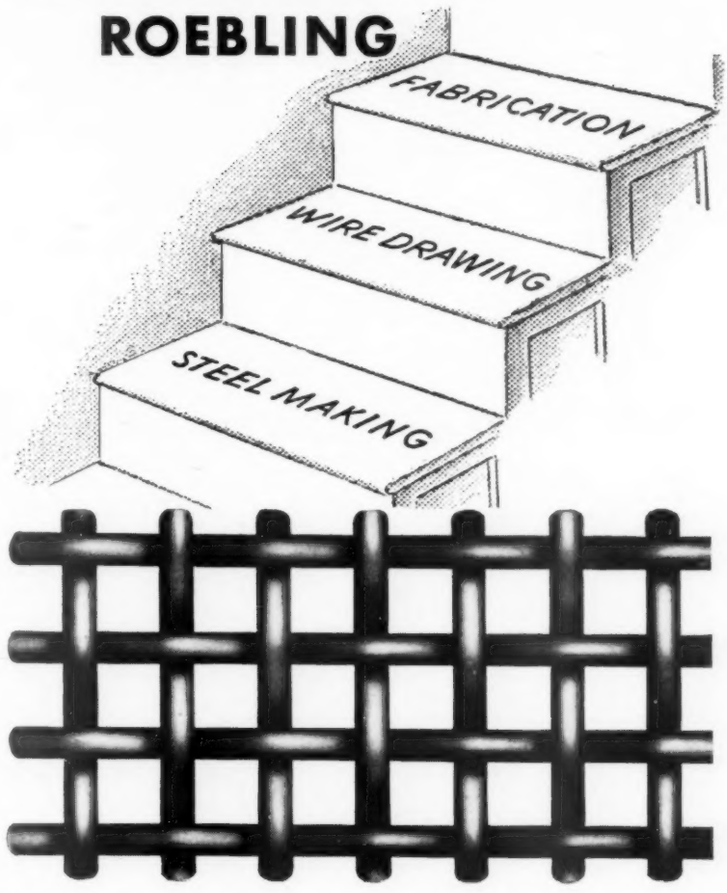

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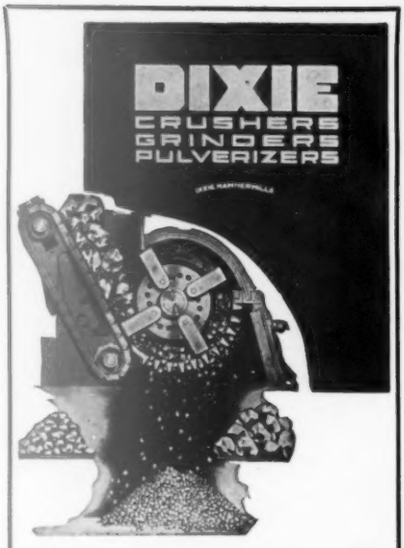

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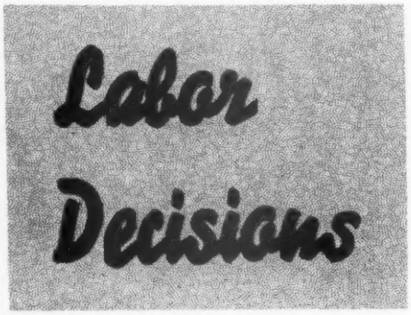
lations and of classification which will be more easily interpreted and applied.

Reparation Refund—In the Scott County Milling Co. case in which the Supreme Court ruled that reparation would have to be refunded when the Commission reversed its decision on reparation, as abstracted in PIT AND QUARRY, August, 1939, page 56; the complainants have asked the Commission for reopening and reargument and have filed a motion in the Supreme Court for rehearing.

Traffic Managers in Ohio—A bill is being presented to the Ohio State Legislature which proposes to set up a state board of examiners for traffic managers with the power to issue certificates of qualification as certified traffic managers to any who successfully pass the examinations held by the board or who qualify under the conditions set forth in the bill. Certificates could be revoked after hearing at which the accused would be represented by counsel where it was shown that the certificate holder obtained his certificate by fraud or was found guilty of fraud and deceit in the his practice or had been convicted of felony by a court of justice or where he had been found guilty of gross incompetency or recklessness in the performance of his duty. Certificates would entitle the holders to designate themselves as certified traffic managers. A charge of $10.00 would be made on application and $10.00 on receipt of the original certificate. The bill further provides for appeals to the common p'eas courts in cases where the board refuses to grant a certificate or where it has revoked a certificate.



"Partnership"

Saito et al. v. Waiters and Waitresses Union Local No. 2 of Brooklyn and Queens et al., decided by the New York Supreme Court, Special Term, Kings County, April 10, 1939; reported at 12 N. Y. S. (2d) 283. The plaintiff in this case, a restaurant, sought an injunction to restrain the defendant union from picketing, alleging that everyone working on the premises was a partner and that consequently no "labor dispute" was involved. The court finds no convincing evidence that a true partnership exists, but that the alleged arrangement "is a scheme—simple to concoct, in effect seriously destructive—born of a desire to reduce overhead by seeking to avoid employer's financial responsibilities as required by those statutes that treat with employment of labor, workmen's compensation, unemployment insurance and more important, to win for this enterprise the labor law immunities which surround a 'one man business'." The injunction, consequently, is denied.

Interstate Commerce

National Labor Relations Board v. Crowe Coal Co., decided by the U. S. Circuit Court of Appeals, Eighth Circuit, June 26, 1939; reported at 104 Fed. (2d) 633. The essential question for decision in this case (which was an appeal from an order of the board) was whether the respondent coal company was engaged in "interstate commerce" so as to make it subject to the National Labor Relations Act. The company is a relatively small producer of soft coal in Missouri and sells its product exclusively in that state. A few of its customers are engaged in interstate business and use the coal in their business. Other customers ship the coal purchased by them from the coal company into other states. About 34,000 tons, or 13 per cent., of the coal produced by the respondent company thus finds its way into states other than Missouri. The company has always operated its mine with non-union labor, and employs an average of 50 men. In 1935 it discharged four employees because of union activities. The union filed charges with the National Labor Relations Board, which took jurisdiction. The coal company, contending that its activities are purely intrastate, challenged the jurisdiction of the board.

The court, sustaining the findings of the Board, holds that in spite of the small scale of the respondent's operations and the small amount of its coal entering interstate commerce, its operations affect interstate commerce so as to make it subject to the act and to the jurisdiction of the board. The board is likewise found not to have abused its discretion and its orders in the case are affirmed.

Company Union

National Labor Relations Board v. National Licorice Co., decided by the U. S. Circuit Court of Appeals, Second Circuit, June 12, 1939; reported at 104 Fed. (2d) 655. This was an application of the National Labor Relations Board for an order enforcing its order against the respondent company. The court sustains the board's findings that the company engaged in unfair labor practices in refusing to recognize an outside union as representing a majority of the workmen, and that it fostered and dominated a company union, through which it made unlawful contracts with its workmen, unduly restricting their rights secured by the National Labor Relations Act. The contract made with the company union, says the court, showed that the union actually formed was not a free organization, and that the company was exacting unlawful concessions from it. The contract provided that the men should not demand a closed shop, or a signed agreement with any union, and that the company had the unconditional right to discharge any of them for any reason, "regardless of his or their affiliation or non-affiliation with any union", though it would not do so for any "legitimate union activities conducted outside of company time or company property, or because of any affiliation with the union".

The court observes that "it is indeed unlawful for a union to agree to an open shop; but it is another thing to agree not to propose changing to a closed shop, and the word 'demand' covered a proposal. The same is true of the stipulation not to 'demand' a signed agreement. A party to a contract does not break it, when he proposes to the other party that conditions have so far changed as to make desirable a change of the contract. There is nothing unlawful in that, so long as it is not a masque for threatening to violate the existing contract. Perhaps in labor disputes it ordinarily will be, but the right to propose the change is secured by statute as part of the right to negotiate." In addition, the court makes various findings supporting the board's order which required the respondent company not to treat the company union as the representatives of the employees. An enforcement order was granted.

Union Activities

Burlington Dyeing & Finishing Co. v. National Labor Relations Board, decided by the U. S. Circuit Court of Appeals, Fourth Circuit, June 13, 1939; reported at 104 Fed. (2d) 736. The court decision in this case modifies an order of the board for reinstatement of em-

ployees which the board held had been discharged on account of union activities. The court affirms the requirement that three employees be reinstated, but overrules the requirement in the case of an employee who had violated company rules and damaged company materials. The respondent company challenged the board's jurisdiction, but, since the company's raw materials and finished products move in interstate commerce, the court, following the Supreme Court's ruling in the *Jones & Laughlin* case, 301 U. S. 1, 57 S.Ct. 615, 81 L.Ed. 893, 108 A.L.R. 1352, holds that the business comes within the purview of the National Labor Relations Act.

Picketing

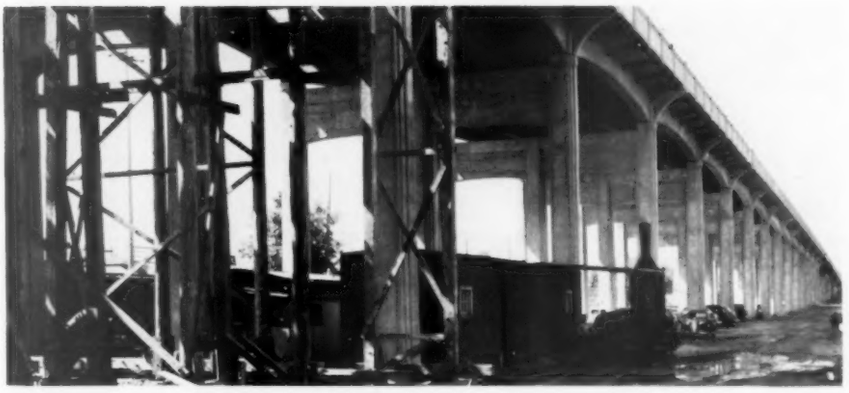
People v. Harris, decided by the Supreme Court of Colorado, May 29, 1939; reported at 91 Pac. (2d) 989. The defendant in this case was acquitted on a charge of picketing in violation of Sec. 90, Chapter 97, Colorado Statutes of 1935, and the acquittal is sustained by the Supreme Court on the ground that the anti-picketing provision impairs freedom of speech and is unconstitutional. The employer has the right to refuse to pay union wages and maintain union standards; correspondingly, labor has the right to decline to carry on any business relation with such an employer. Any loss which occurs in such economic controversies, says the court, is "damage without injury."

Occupational Diseases and the Law

Disability

Belanowitz v. Travelers Ins. Co., decided by the New Jersey Court of Common Pleas, Essex County, June 13, 1939; reported at 6 Atl. (2d) 665. The plaintiff (employee) in this case contracted mercurial poisoning, which is a compensable occupational disease in New Jersey, and wanted to quit work. At the employer's request, he remained on the job to help out during a rush season. Before he quit work altogether the employer's contract with the insurance company (defendant) expired. The employer became bankrupt, and this action is an effort by the employee to compel the insurance company to pay the compensation for total disability which was awarded (against the employer) by the Workmen's Compensation Bureau.

The substantial question for decision was whether compensation for disability from an occupational disease should be paid from the time of functional disability (which occurred before the time the insurance contract expired) or from the time of occupational disability (the



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employee remained on the job until after the insurance contract expired). In the former case the insurance company would be liable for payment of the disability compensation awarded; in the latter case, it would not.

The rule in accident cases is that functional rather than occupational disability constitutes the disability which is compensable. It was held in *Sutkowski v. Mutual Chemical Co.,* 115 N.J.L. 53, 178 Atl. 71, that a functional loss, permanent in quality, was a compensable disability, even though the employee's capacity to render the service at which he was engaged was not thereby impaired or his earning power diminished. "The test is not impairment of earning capacity; it is rather the 'loss of physical function which detracts from the former efficiency of the body or of its members in the ordinary pursuits of life.'" The court holds that the same rule is applicable to cases of compensable disease, and that the insurance carrier in the present case is liable for payment of the award. If the employee had followed his own desires and quit, there would have been no question of the insurance carrier's responsibility. To hold that "because the workman sought, at the expense of his own health, to help out his employer, he is now to be deprived of recovery . . . would simply put a premium on being a quitter."

There were two awards of disability in the case of this employee, one of 25 per cent. and a later one of 100 per cent. The court holds that the first award controls the amount of compensation up to the time of the second award, and for that period was not superseded by the later award. On a procedural question, the court rules that notice to the employer constituted notice to the insurance carrier, and that the statute creating this rule is constitutional.

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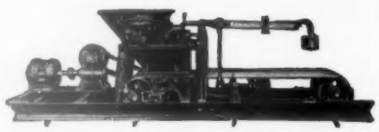

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Insurance

Hillside Fluorspar Mines v. Hartford Accident & Indemnity Co., decided by the Appellate Court of Illinois, First District, Second Division, June 28, 1939, rehearing denied July 11, 1939; abstract published at 21 N. E. (2d) 912. This is a suit for the insurance company's breach of undertaking in a standard workmen's compensation and employers' liability policy to defend suits against the plaintiff by employees for occupational diseases contracted while working in the plaintiff's mine. In the lower court judgment was rendered for the plaintiff, but this judgment is reversed by the Appellate Court. The latter court holds that under the Occupational Diseases Law an employee is left to common-law remedies for occupational diseases in occupations not described in the act; and that under a policy in which the insurer agreed to pay the amount due because of the obligation of the employer for "accidental injuries" under the Workmen's Compensation Act and Occupational Diseases Law, and to defend suits on account of such injuries, the insurer was not liable to the employer for refusing to defend an employee's action against the employer for damages growing out of the occupational disease of fluoricosis or fluorite pneumoconiosis, commonly called "miner's consumption," since an occupational disease is not an "accidental injury."

Silicosis

Gustafson's Case, decided by the Supreme Judical Court of Massachusetts, June 29, 1939; reported at 21 N.E. (2d) 961. This decision sustains an award of compensation for total disability from silicosis. The employee was a stone-cutter for a quarry company from 1913 until 1934 and was exposed to considerable granite dust. The symptoms of silicosis began in 1930, but the employee did not learn the nature of his ailment until January 9, 1937. The court holds that the accumulation of granite dust by a stone-cutter, during the course of his employment, constitutes a personal injury under the Workmen's Compensation Act (General Laws, Tercentary Edition, Chap. 152) when it causes incapacity to work (with citations); that personal injury may occur before the date of inability to work; and that the workmen's incapacity in this instance was directly traceable to his employment at the quarry. Certain employment on various Federal projects in the intervening years did not affect the result. The court also holds that the employer's insurer was not prejudiced by want of notice, where the claim for compensation was filed within five weeks after the employee discovered the nature of his ailment.

Limitations

Cleveland v. Laclede Christy Clay Products Co., decided by the St. Louis Court of Appeals, Missouri, June 6, 1939; reported at 129 S.W. (2d) 12. The employee, plaintiff in this action, operated a truing machine used to grind and polish tile, and alleged that because the dust-collectors were not efficient in removing all the dust, he developed trouble with his respiratory organs and chest. He was first aware of such injuries in 1932, but was first informed in 1937 that his ailment was the occupational disease silicosis. He filed a claim for compensation and was awarded compensation by the Missouri

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Workmen's Compensation Commission. On appeal by the employer and the insurer to the circuit court the award was reversed. That reversal of the award is sustained by the Court of Appeals on the ground that the claim was barred by the six-months statute of limitation. The statute of limitations, in the court's opinion, runs from the time of the injury (of which the employee was conscious as early as 1932) and not from the time (1937) that it was first identified by name.

Foreign Developments

Sand and Properties of Mortar and Plaster

There are differences of opinion as to the proper composition of lime mortars for stucco work and for masonry mortar. The German Railways in 1936 prescribed specifications for (a) water-tight plaster and (b) masonry mortar and plaster. The experiments reported here were undertaken to determine whether the sand mixes so prescribed were strictly appropriate. The results indicate that, in the composition of mortars and plasters, sands should be classified for (a) exterior stucco, including water-tight plasters, (b) interior plaster, and (c) masonry mortar. Coarse sands (to 7 mm.) are suitable for (a), and finer sands for (b) and (c). The gradation for (a) and (c) must be such that sufficiently impermeable mortars with good load capacity are obtained; for (b) the strength is the more important property. The workability of the mortar or plaster and the thickness of the layer applied must also be taken into consideration.—Otto Graf in *Tonindustrie-Zeitung* 63:320-325, April 3, 1939.

Effect of Admixtures on Volume and Shrinkage

Mineral dusts or powders added to cements have a considerable effect on the cementing material, in that they increase or decrease the volume of the hardened pastes. If these mineral powders are admixed with mortar or concrete they act not only as mere correction of the gradation of the aggregate; on account of their effect on the volume of the cement pastes they also act on the density of the mortar or concrete.

The effect of these mineral dusts on

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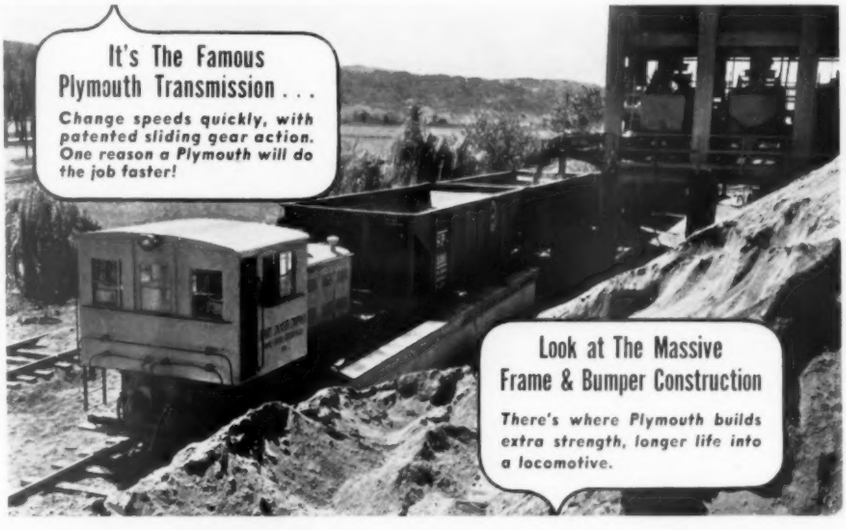
New Holland Roll Crusher has patented pulsating feeder that doubles capacity. Rib shell construction increases angle of grip and reduces dust. All standard sizes—capacities up to 100 tons per hour.

Send for Bulletins

NEW HOLLAND MACHINE CO.

New Holland Pennsylvania


It's The Famous Plymouth Transmission . . .
Change speeds quickly, with patented sliding gear action. One reason a Plymouth will do the job faster!
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There's where Plymouth builds extra strength, longer life into a locomotive.

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When the *right* locomotive goes to work on your job, you start saving time, fuel, money. Get a free analysis of your locomotive problem—from Plymouth's industrial locomotive engineers. Write, wire or phone. . . .

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How to—
SAVE MONEY ON PIPE

QUESTION: Can I use light-weight pipe for pressure lines?

ANSWER: Yes! If it's Naylor Lockseam Spiralweld Pipe.

QUESTION: Why can no other light-weight pipe do the job?

ANSWER: Only Naylor has the Lockseam Spiralweld structure that makes Naylor Pipe leak-proof, stronger, more flexible, safer.

QUESTION: How does it work?

ANSWER: The Lockseam carries the load relieving the Spiralweld of stresses and strains. The weld serves the primary function of sealing the pipe leak-tight. All other light-weight welded pipe depends on the weld to hold the structure together.

Sizes from 4" to 30" in diameter with all type fittings and connections. Complete fabrication service.

WRITE FOR CATALOG NO. 37

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CHICAGO, ILLINOIS

NAYLOR LOCKSEAM SPIRALWELD PIPE

NEW
DYNAMITES
and SEMI-GELATINS

POWDER NATIONAL COMPANY

If you are not using the new Dolomite or Tungite explosives, your blasting may be costing you up to 15 percent more.

These new explosives are in many ways superior to old types ammonia dynamite and ammonia gelatin, which they replace. They are safer, and cost less per blast.

Make us prove these facts—we'll be glad to.

NATIONAL POWDER CO.

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ELDRED, PA.

the properties of the mixed cements depends not only on their fineness of grinding but also on their chemical nature. Chemically active mineral powders (lime dust, trass) cause an increase in the quantity of gaging water, of the volumes of the water suspensions and of the hardened cement paste, as well as a greater shrinkage of the mixed cement. The mineral dusts which are chemically inactive (lime-stone or standard sand dust) have a very feeble or even a negative effect. With all these phenomena the nature of the cement also plays a significant part.

A good parallelism exists between the amount of gaging water, the volumes of the hardened cement, and shrinkage, all of which are influenced in the same direction. Between shrinkage and loss of weight during drying no strict parallelism could be established. Exceptions were determined, which most frequently are brought about by the presence of calcium chloride in the gaging water.—Dr. A. Steopoe in *Zement* 28:141-146, 155-161, March 9 and 16, 1939.

Temperature Correction for Thermos Process

The principal or only difficulty encountered in the application of the Thermos method for determination of the heat of hydration (described in *Revue des Materiaux de Construction,* No. 348, September, 1938, p. 161) arises from the necessity of taking into consideration the variations in the surrounding atmospheric temperature. In a laboratory provided with thermostatic cabinets and rooms of controlled temperature it is easy to meet this difficulty, but this is not possible in general use. Dr. A. Frey Samsioe of Stockholm suggested the interesting solution of a control bottle filled with an inert "mortar" of sand and water. The application of such a control bottle makes possible an automatic correction for the atmospheric temperature and makes the use of thermostats absolutely unnecessary.—Jean Cleret de Langavant in *Revue des Materiaux de Construction et de Travaux Publics,* No. 357, June, 1939, pp. 106-109.

The Clarence L. Boyd Co. with headquarters at Guthrie, Okla., and a branch office in Oklahoma City, has been appointed distributor for the state of Oklahoma by Bucyrus-Erie Co., South Milwaukee, Wis.

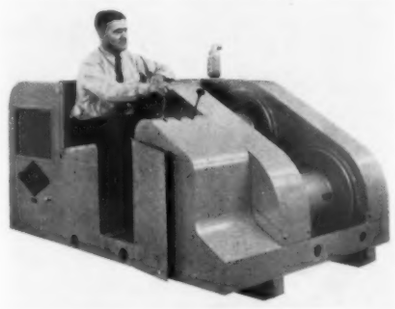
The Cleveland Worm & Gear Co., manufacturer of worm-gear speed-reducers, and the Farval Corp., manufacturer of centralized lubricating systems, have consolidated their Chicago offices at 327 S. La Salle St. E. J. Ehret and John D. Kinsey, who have represented both concerns in Chicago for several years, are in charge.

New Machinery and Supplies

• Safety Hoist

Hailed as one of the most modern and outstanding contributions to the hoisting field, the new Clyde safety hoist is a 37 h.p. double-drum gasoline hoist, with a 4500-lb. single-line pull at 160 to 195 f.p.m.

Safety is assured by a steel housing that incloses all moving parts preventing accidents and keeping the cable from becoming entangled in the gears. Greater efficiency is obtained through the smooth, effortless operation of the hydraulic band friction that results in reduced operator fatigue and greater production. All operating levers are conveniently grouped to a comfortable, adjustable operator's seat.



Double-drum gasoline hoist.

Insurance against delays is provided by grease-packed ball-bearings throughout the hoist. This hoist does not require lubricating. Frictions do not require adjusting.

Additional noteworthy features of the new hoist include: improved ball-bearing cam-operated brakes, no lubricating necessary; one-piece, all steel frame; skid-type base that adds to portability; tool box under operator's seat; ample waterfall of drums with easy visibility of cable from operator's seat; steel gears with machine-cut teeth and chain drive run in a bath of oil.

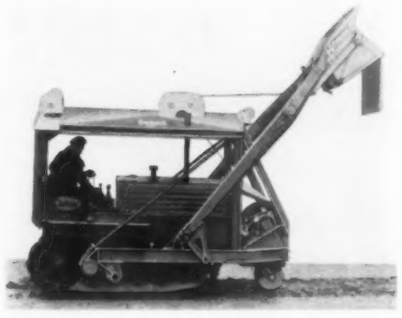
• Overhead Shovel

Of absorbing interest to operators is the new, unique Sargent overhead shovel, a tractor attachment for moving earth or similar material. By the addition of an interchangeable group of comparatively inexpensive accessories, a standard crawler tractor, with a single operator, has the versatility of several separate machines.

In its primary shape the overhead shovel is a fast and effective dirt shovel, capable of hard digging and with a capacity in ordinary digging of 4 buckets per minute. The smallest shovel for earth excavation is ⅜ yd. Larger sizes are provided for light materials and for larger tractors. It is not necessary to turn the tractor to load into trucks.

A bulldozer blade with down pressure can be hooked onto the shovel in 15 minutes. It can be used as a tractor without removing any of these accessories.

When used as a shovel, it is equipped with



Overhead tractor shovel shown in digging and discharging positions.

a cast alloy-steel bucket shell with teeth that will stand hard digging. It gets its "crowd" by backing the tractor. When filled, the bucket is hoisted straight up over the tractor and dumped in front by tripping a hinged cover. It can load into high trucks. A caster wheel under the front of the shovel frame protects the tractor springs from the load of the bucket when being dumped. Four shovels a minute in ordinary digging are not difficult for the average skilled operator. One man can operate both the tractor and the shovel. Two hand levers and a foot brake are all that the shovel adds to the standard tractor controls. A reinforced steel roof protects the operator at all times.

The tractor's ability to move the shovel quickly from place to place is also advantageous in loading road materials from stock piles and in loading from sand-and-gravel yards or pits.

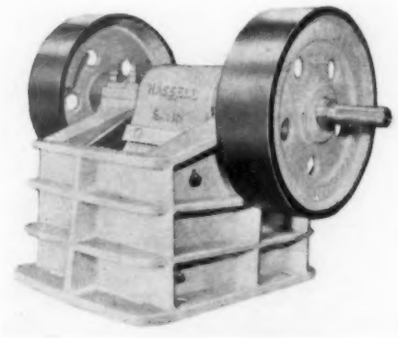
The Sargent overhead shovel is being manufactured by Maine Steel, Inc., South Portland, Me. At present it is being manufactured for use with Cletrac tractors only but will eventually be made available for all standard makes of crawler tractors.

• Jaw Crushers

A line of semi-steel, roller-bearing, swinging-jaw crushers, built in sizes from 5 in. by 6 in., to 9 in. by 16 in. by the Hassell Engineering Co., Colorado Springs, Colo., is noted for the high capacities attained.

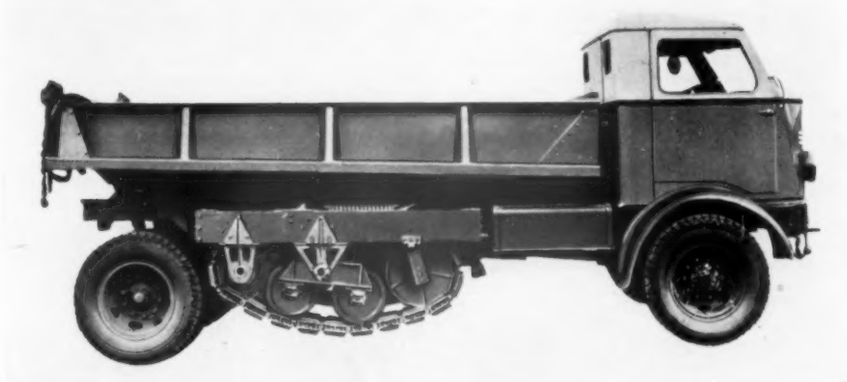
Of the forced-feed type the Hassell crusher is adapted to the crushing of stone or ore from run-of-mine sizes down to pieces ¾ in. diameter, or finer, with capacities from 8 to 12 tons per 10-hour shift for the crusher with 5-in. by 6-in. jaw opening, up to 60 to 100 tons per 10 hour shift for the crusher with the 9-in. by 16-in. jaw opening, depending upon the reduction desired.

This type of jaw crusher has the combined forward and downward motion of the mov-



The 9-in. by 16-in. jaw-crusher.

able jaw which greatly increases the capacity and provides a prompt discharge of the crushed product. The upper end of the movable jaw is mounted directly on a rotating eccentric shaft with Timken roller-bearings, for the eccentric, which construction eliminates the heavy pitman and one set of toggles used in the original Blake type of jaw crusher. Such reduction in the number of moving parts saves a considerable amount of power, reduces the number of bearing surfaces to lubricate and also saves the cost of maintenance and renewal of a number of crusher parts.



The Linn Manufacturing Corp., Morris, N. Y., has announced a new type of haulage unit known as the Model C-5 which can be instantly converted from track to wheel operation, or vice versa, merely by throwing a control lever mounted at the driver's position. With either track or wheel operation available at the will of the driver, the unit can handle many types of hauling jobs which at present require auxiliary equipment or rehandling of the load. In hauling from pits, for example, the C-5 will come up out of the pit unaided with its own load, and on its own tracks; and when it reaches good road, it can roll away at high speeds.

The Model "135" LOADER

is the fastest loading machine within $5,000 of its price, as well as heaviest, strongest and most powerful Loader built. It competes with BIG equipment. On a cost-per-yard basis, it's all alone. *Bulletin 134*

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Triple Powered Screen Vibration

GREATER CAPACITY AND UNIFORMITY	GREATER FINE SCREENING EFFICIENCY	GREATER OPERATING ECONOMY

Like ethyl in gas, TRI-VIBE in Type C Leahy Screens put extra energy in performance. There is faster action, and dynamic differential vibration is transmitted to every square inch of free-swinging screen jacket. You handle *fine screening* without blinding and increased production at reduced cost.

Write for Bulletin No. 14

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The Original Deister Co.

Est. 1906

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LONG LIFE
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FOR
QUARRY, ROAD,
DREDGING,
AND
MINING MACHINERY
The Frog, Switch & Mfg. Co. CARLISLE, PA.
ESTABLISHED 1881

This type of crusher provides a single crushing operation and saves the high initial cost of secondary-crushing units. All materials used in this crusher are high grade with manganese-steel jaws and cheek plates.

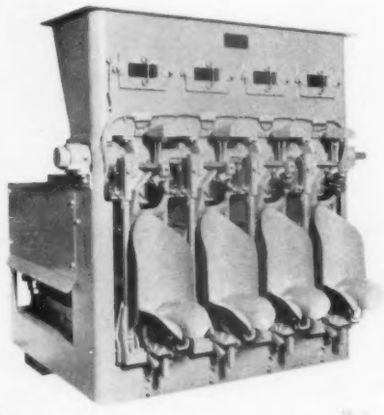
The company manufacturers a complete line of mining and quarry equipment including ball-mills, classifiers, agitators, thickeners, pumps and flotation machines.

• Packing Machine

During the past 12 years, a large number of Modern automatic weighing and packing machines have been placed in service in Europe for filling cement, lime, gypsum, etc., into valve sacks.

Now, the Modern Valve-Bag Co., Allentown, Pa., has made available to American industry a new 4-spout machine which is illustrated herewith. Features of the machine are as follows:

1. One operator only is required to put the empty sacks to the spouts. The whole operation is then done automatically by the machine itself.



Four-spout packing machine for valve bags.

2. An ingenious dust-piping system controlling the dust at the source and the "ventilator" make a clean package a positive achievement. The ventilator is a simple device which relieves the back pressure in the filling bag and also vents the material in the filling tube itself, thus preventing spraying of material on the outside of the package as it is discharged.

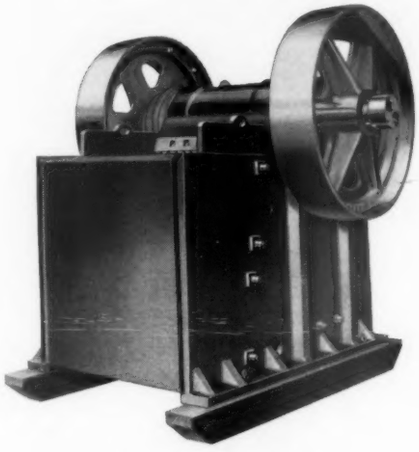
3. The hourly output (in the case of cement) has been raised to 1200 sacks (300 bbl.) and this with 4 scales, operated by one man. Other makes of packers capable of producing this high output are said to require 12 scales.

4. Constant and uniformly accurate weights are maintained during a long filling period, due to the improved method of changeover from the main filling to the dribble feed. The "ventilator" is also essential to weight accuracy in packing moisture-proof paper. The combination of these two features makes possible a maximum variation of ½ lb. plus or minus.

Complete details may be obtained from the manufacturer.

• Crushers

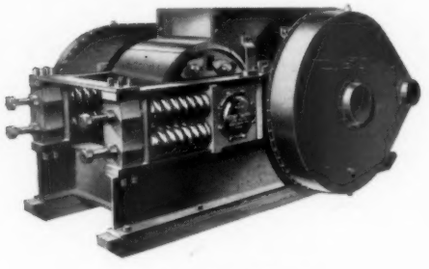
The Iowa Manufacturing Co. of Cedar Rapids, Ia., is placing a new and specially designed large-capacity Cedar Rapids jaw crusher on the market. This new primary crusher with a jaw opening of 25 in. by 40 in. is designed and built to take big rocks direct from the quarry thereby reducing the amount of intermediate breakage, drilling, dynamiting, and secondary shooting normally necessary. The manufacturer claims this equipment can be fed directly by a 1¼ cu.yd. shovel. Large



New primary jaw-crusher.

rocks are less apt to bredge and stop the feed because a narrow angle nip assures continuous downward travel of rock in the jaws and eliminates slippage and "climbing."

With a jaw opening of 1,000 sq.in., this crusher has rated capacities of from 75 to 125



Roller-bearing roll crusher.

t.p.h. producing 4-in. material; 100 to 150 t.p.h. reducing to 5-in. product; and 125 to 175 t.p.h. crushing to 6-in. size.

Another new product just announced, is the Cedar Rapids 40-in. by 24-in. roller-bearing roll crusher. This secondary crusher, according to the manufacturer, has several new features which increase the life of the crusher and decrease operating and maintenance cost.

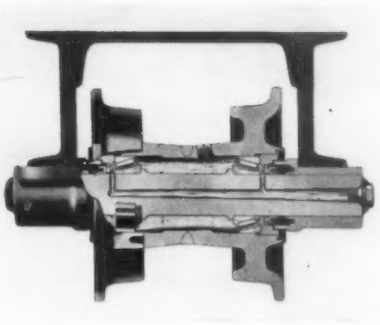
Each roll shell is made up of seven segments which are locked on the main rotor with tapered wedges and locking bars. Segments can be easily and quickly removed without disturbing bearings or shafts. Segments are tapered so that when locked together they form a true and complete circle.

One of the most important cost-reducing features claimed by the maker is the exclusive bearing seal design. This sealing method keeps dirt and grease out and in respectively so that lubrication is necessary only once a year.

• Truck Wheel

A new, positive-seal truck-wheel assembly for tractors which will eliminate daily roller greasing has just been announced by Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

In this new truck wheel assembly, ordinary bearings are replaced by tapered roller bearings with a positive-seal arrangement that keeps in lubricating oil and keeps out dirt, dust, mud and grit. Lubrication, according to Allis-Chalmers engineers, is required only once



Positive seal truck-wheel assembly.

every 200 operating hours instead of every 8 hours as heretofore.

Not only does this new positive-seal arrangement keep out dirt and other foreign materials, but it is so constructed that all of the old oil is forced out each time the assembly is lubricated. Thus the user is doubly protected against abrasive grit working into his track assembly.

The manufacturer believes the new positive-seal truck wheel assembly will greatly prolong track life, assure savings of 80 to 90 per cent. in lower lubrication costs and increase tractor operating time by eliminating the usual time out every 10 hours for greasing.

At present this new truck wheel is available on Allis-Chalmers tractor models "M", "K", "K-O", "S", and "S-O".

• Excavator

The Universal Power Shovel Corp., Milwaukee, Wis., announces a new ¾-cu.yd. shovel to complete its line of small-sized excavators. The new machine is known as the Unit 1020. Although of unusually lightweight construction, it is said to have an abundance of speed and power for heavy-duty performance. It is equipped with a 19-ft. boom and 14-ft. stick to provide ample reach and dip for practically any type of job. Crawlers run on drop-forged, heat-treated rollers. All gears and bearings are fully inclosed in a dust-proof, oil-tight, one-piece cast case. The company claims this feature eliminates the need for greasing or adjustments, affords protection against metal-cutting abrasives, reduces friction and prevents misalignments.

New ¾-cu.yd. shovel.

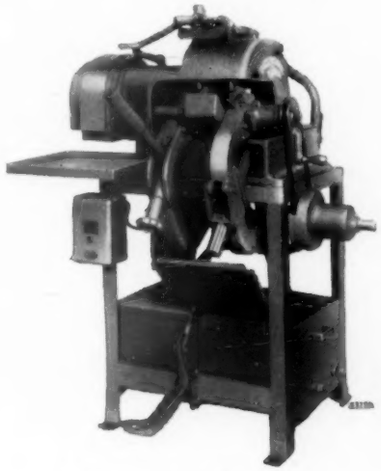
Other unit engineered features include drop-forged, heat-treated alloy steel gears . . . shafts full-floating mounted in ball bearings . . . ten spline fittings throughout main machinery case . . . massive double-disk clutches . . . direct drive from engine to countershaft . . . power unit mounted integral with operating mechanism . . . turntable mounted on four drop-forged, heat-treated conical rollers . . . drums mounted on short, individual, splined shafts. No bushings to lubricate or replace . . . single screw crawler adjustment, packed in grease.

The Unit 1020 is convertible to all attachments. New literature, describing this machine in detail, is now available.

• Bit Grinder

A new non-automatic "jackbit" grinder has just been announced by the Ingersoll-Rand Co., New York, N. Y. This machine is adaptable for use with all types of standard detachable rock-drill bits.

Known as the Size J-3, it has a capacity of 35 hard bits or 50 annealed bits per hour,

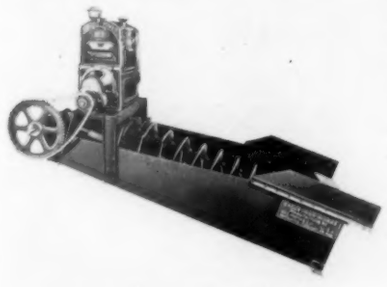


Non-automatic jackbit grinder.

compared with a capacity of 60 hard bits or 100 annealed bits for the size J-5 semi-automatic jackbit grinder introduced in the Spring. Both machines are available for electric, air, gasoline-engine, or belt drive.

• Washer

A new and interesting application of Diesel power is shown in the accompanying illustration. The Hercules Diesel 4-cyl. power unit furnishes power for operating a double screw sand-and-gravel washer, manufactured by Eagle Iron Works, Des Moines, Iowa. As will be noted this washer is a completely self-con-



Diesel-powered washing screw.

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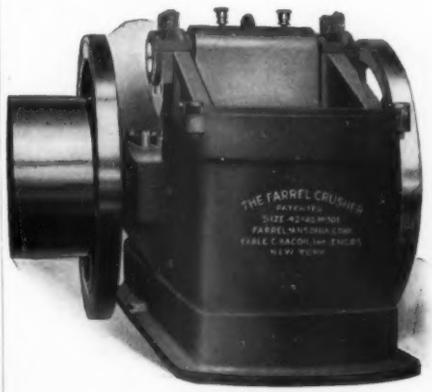
FARREL BACON
CRUSHERS
Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants. Engineering Service



EARLE C. BACON, Inc.
17 John St. New York, N. Y.

tained unit with the engine readily accessible for servicing, yet out of the way, so far as the operation of the washer is concerned.

The washer consists of 2 spiral screws each 12 ft. long. These screws draw the aggregates to the center of the tub and convey them upward to the discharge end. Wash-water inlets are arranged along the tub between the 2 screws. In operation the wash water swirls upward through the aggregates carrying the foreign matter to the surface and down to lower waste water discharge end of the tub. Timken roller bearings carry the upper ends of the spiral screw shafts and cutless rubber bearings are used at the lower ends of the shafts which are subject to abrading action of the sand and water.

• Flue-Gas Analyzer

In line with the modern trend in the design of industrial products toward streamlining and the use of plastic material the Hays Corp. of Michigan City, Ind., announces a new Orsatomat, or automatic flue-gas analyzer.

The greatest change is in the tilting analyzing unit which is now composed of a transparent plastic instead of hard rubber as formerly. The new unit is smaller, lighter in weight and more compact. It is housed in a newly-designed streamlined, pressed-steel case along with a draft measuring and indicating unit. Both analyzing and indicating units are removable. If desired a flue gas thermometer may also be had to fit inside the case.

The Orsatomat is a true Orsat as it employs the principle of volumetric measurement and chemical absorption. And the measuring and absorption of CO_2 is done automatically through an ingenious use of mercury. All that the operator needs to do to obtain an accurate analysis of a sample of combustion gas is to pull out a small rod that protrudes from the side of the case, aspirate the gas into the unit by means of a rubber bulb and push in the rod—the percentage of CO_2 is instantly indicated on a dial at the front of the case.

As the rod is pushed in it tilts the pivoted unit causing a column of mercury to flow by gravity to push the trapped gas sample into

The automatic flue-gas analyzer.

the absorption chamber (a steel-wool-packed compartment freshly flushed with absorbing chemical) where the CO_2 is instantly absorbed. This absorption causes the sample to shrink creating a vacuum which is effective on a sensitive metallic bellows connected to the dial pointer. The entire process requires about one half minute.

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LARGE STOCK OF RAW MATERIAL FOR QUICK SHIPMENT
Inquiries Promptly Answered

STANDARD STAMPING & PERFORATING CO.
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CHICAGO, ILL.

Recent Equipment Installations ★ ★ ★

United Quarries, Inc., Winfield, Pa., and Binkley & Ober, Feedersburg, Pa., have installed McLanahan & Stone log washers while the Gibsonburg Lime Products Co. and Earl P. Curry Sand & Gravel Co., Titusville, Pa., are now operating with new McLanahan & Stone crushers * * * * *Model 7 Stearns Joltcrete block machines have recently been installed by Kurtz Bros., Ephrata, Pa.; Jesse S. Morie, Vineland, N. J.; Pottstown Cement Products, Pottstown, Pa.; and Union Sand & Gravel Co., Painesville, O.* * * * A Butler ready-mixed-concrete plant has been opened at Manitowoc, Wis., by the Spindler Co., concrete being delivered by Blaw-Knox and Smith-Mobile truck mixers.

A new Marion shovel is now operating in the pit of the Killins Gravel Co., Ann Arbor, Mich. * * * * *Another Brooks-Taylor aging tank has been added at the lime-putty plant of the Louisville Lime Mortar Co., Louisville, Ky.* * * * H. G. Pendergast has installed a Besser Champion stripper at his concrete-block plant at Rantoul, Ill.

Steam power has been abandoned in favor of Diesel at the plant of the Guaranteed Gravel & Sand Co., Mankato, Minn., two Cummins engines furnishing the power * * * * Multiplex equipment has recently been installed in the concrete-block plants of: Linton Concrete Products Co., Tonawanda, N. Y.; F. H. Thompson, Breckenridge, Pa.; J. & M. Concrete Block Co., Dexter, Mich.; Roy Sias, Midland, Mich.; H. M. Pringle, Irvin, Pa.; and Evans Bros., Zanesville, O.

Trade Literature

Two New Jackbit Grinders. 12 p. Ingersoll-Rand Co., New York, N. Y.

Tractor Model S Costs You Less. 24 p. Allis-Chalmers Mfg. Co., Milwaukee, Wis.

*Reliance V*S Drive.* (Folder.) Reliance Elec. & Eng. Co., Cleveland, O.

Capacitator Motors. 4 p. *Outdoor Oil-Blast Circuit Breakers,* 8 p. *Metal-Enclosed Switchgear,* 16 p. General Electric Co., Schenectady, N. Y.

Bargains in Used Hardinge Equipment. (Folder.) Hardinge Co., Inc., York, Pa.

Diesel D6 Tractor. 32 p. Caterpillar Tractor Co., Peoria, Ill.

Instruments for Testing Cement, Soils and Petroleum. 164 p. American Instrument Co., Silver Spring, Md.

Dust the Destroyer. 24 p. Cutler-Hammer, Inc., Milwaukee, Wis.

Kue-Ken Balanced Crusher. 8 p. Straub Mfg. Co., Oakland, Cal.

Buda Diesel Electric Power Plants. 8 p. The Buda Co., Harvey, Ill.

Furnace Refractories. 12 p. McLeod & Henry Co., Inc., Troy, N. Y.

Seal Master Ball Bearings. 8 p. Stephens-Adamson Mfg. Co., Aurora, Ill.

Fuller Air-Quenching Cooler. 8 p. Fuller Co., Catasauqua, Pa.

Car and Barge Haulage Systems and Car Retarders, 12 p. *Vibrex Screens,* 12 p. Robins Conveying Belt Co., Passaic, N. J.

Worthington Heavy Duty Drifters. 6 p. Worthington Pump & Machinery Corp., Harrison, N. J.

Ways and Means to Greater Safety. (Folder.) Atlas Powder Co., Wilmington, Del.

INCORPORATIONS

Waynesboro Concrete Products Co., Waynesboro, Va. Capital: $50,000. W. G. Mathews, C. G. Quesenbury, Clifton Forge.

Lain Gravel Co., Cleburne, Tex. Capital: $15,000. J. Lambert Lain, Lorena Lain and J. E. Lain.

Illinois Quarry Co., Taylorville, Ill. Capital: 250 shares $100 par value. J. W. Debrun, L. E. Debrun and C. Schweikert.

Cleveland Ready Mix Co., Cleveland, O. Capital: $25,000. J. A. Persky, E. E. Loeb and Frank Feingold.

Chapman Concrete Works, Inc., Holly Hill, Fla. Capital: 50 shares $100 par value. J. W. Chapman, L. F. Law and T. F. Lance.

Massachusetts Concrete Materials Co., Saugus, Mass. 300 shares n.p.v. Paul Caputo, Ezra Andelman and David Goulis.

A new booklet, *Calcium Chloride and Portland Cement,* has just been issued by the Solvay Sales Corp., New York, N. Y.

This book shows clearly and concisely the exact effects of calcium chloride on Portland-cement mixes, including setting time, early strength and ultimate strength. It shows how calcium chloride affects curing and why the addition of calcium chloride permits a reduction in water cement ratio with a resulting increase in density and water resistance. In addition it contains data concerning the marked effects of varying temperatures on the strength of concrete.

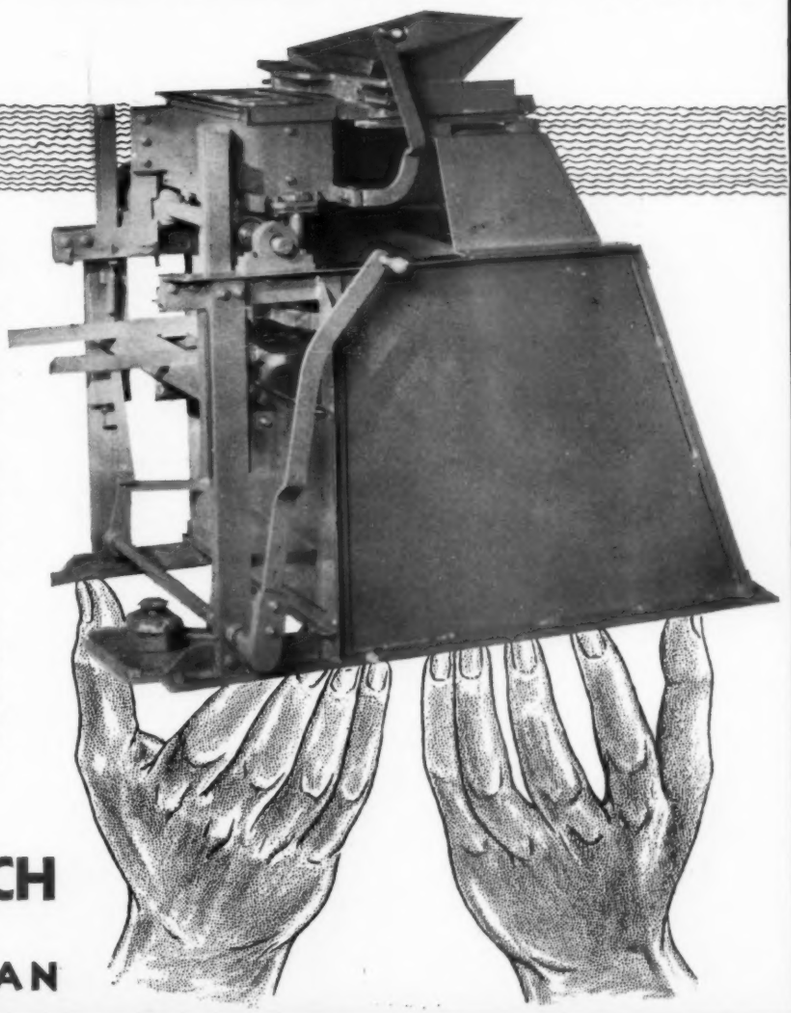
The CONCRETE MANUFACTURER

A Special Section of ...

PRESENTATION TO THE CONCRETE INDUSTRY

VIBR-RITE

Plain Pallet Stripper



Here it is . . . what industry has long waited for . . . a compact hand-operated Concrete Block Machine that will average 800 blocks a day. Works with any light weight aggregate, as well as with concrete, producing block, hollow building tile, partition units, manhole block and fractional units. All block densely packed with smooth, square edges and uniform texture.

Simple to operate, and one man can turn out 100 blocks per hour or better. Feeding hopper moves forward with material that is vibrated into mold box. Then hopper slides back, striking off excess material and finishing top of block with troweling blade. Counter-balanced mold box rolls over and units are stripped down onto a plain pallet.

Powered by 1½ hp motor with V-belt drive on variable speed pulleys to allow adjustment of vibration for any aggregate. Positive foot switch control in front of machine. VIBR-RITE is ideal for small operator who wants to make superior blocks that will command better prices . . . also for large production plants where it can be used for making special and fractional blocks without interrupting operation of big machines on regular blocks.

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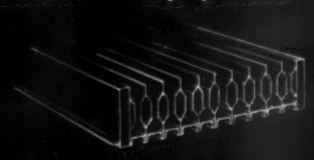
SAGINAW MICHIGAN

Complete Line of Concrete Equipment

VIBRATION and TAMP BLOCK MACHINES

MIXERS

BRICK MACHINES



CONCRETE JOIST MACHINES

MATERIAL HANDLING EQUIPMENT

The CONCRETE MANUFACTURER

September, 1939

A SPECIAL SECTION OF PIT AND QUARRY DEVOTED TO PRODUCTION MARKETING AND USES OF CONCRETE PRODUCTS AND READY-MIXED CONCRETE

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To Manufacture Staves

The Marietta Concrete Corp., Marietta, O., is establishing a new concrete-stave plant just outside of Schenectady, N. Y. CHARLES ROSS and LEONARD CHRISTY will be in charge.

■

Equips Detroit Plants

Two new concrete-products plants in the Detroit area have gone into production with equipment supplied by the Multiplex Concrete Machinery Co., Elmore, O.

The Cecil Block Co., now located at 9970 Freeland Ave., is producing its units on a Multiplex Super Tamper, the machine having a capacity of 5 to 6 blocks per minute. Roy Talcott, 30901 Five Mile Rd., has completed a new plant with Multiplex equipment.

■

Sells Ready-Mixed Plant

The New Albany Ready-Mix Concrete Co., New Albany, Ind., which was established about six months ago has been sold to W. R. Sostheim of Syracuse, Ind.

■

"Creeps" in Concrete

Although hardened concrete may appear perfectly rigid to the layman's eye, scientists know that this concrete deforms, or "creeps," when subjected to heavy loads for long periods of time.

Researches sponsored by the Engineering Foundation at the University of California have shown that this slow yielding, which affects the crackling of concrete, is due to a sort of squeezing of moisture from the mass of the concrete.

Hardened concrete may look and feel dry, but when the binding cement hardens a rigid gel is formed which contains a considerable quantity of very firmly bound water, and much of the water left in the "set" concrete is so tightly held that even drying pressure can not remove it.

However, when a load is applied for a prolonged period more of this moisture is forced out, to cause the deformation known as "plastic flow" or "creep."

Aided by grants from the Engineering Foundation, the California scientists are endeavoring to determine not only the cause for this peculiar phenomenon but how it is affected by various factors such as time, humidity, temperature, etc.

The tests are made by subjecting concrete columns or beams to sustained loads by means of heavy springs or weights, and observing the movements with sensitive gages, over a period of many years. Temperatures and humidities are closely controlled.

In the course of these experiments, it has been observed that the final deformation is roughly proportional to the applied load, being relatively rapid at first and gradually diminishing. Although usually it practically ceases at the end of two years it has been known to continue for as long as ten years.

The most important factor appears to be humidity, since initially moist concretes stored in dry air after loading may flow three or four times as much as similar concretes stored in moist air or under water. Moreover, the age at loading seems to affect the final "creep."

■

Seek Mixer Approval

Members of the National Ready Mixed Concrete Assn. have been asked to approve by letter ballot the "Proposed Tentative Standards and Recommended Practices for Truck Mixers and Agitators of the Open-Top, Revolving-Blade Type", prepared by the standards committee of the association and approved by the board of directors.

The standards cover the type of truck mixer manufactured by the Concrete Transport Mixer Co., St. Louis, Mo.

■

Opens Another Plant

The West Bend Concrete Products Co., West Bend, Wis., recently opened its second concrete-block plant at Menominee Falls, Wis.

The West Bend plant continues to specialize in gravel block while the new plant at Menominee Falls will operate almost exclusively in the production of Waylite units.

■

Glass-Haydite Block

"Glastone," a Haydite concrete block faced with vitrolite structural glass, is being developed by the Libbey-Owens-Ford Glass Co. as a decorative, load-bearing unit.

Cinder-Block Manufacturers Gather at Atlantic City for 3-Day Meeting

THE sixteenth annual convention of the National Cinder Concrete Products Assn. opened Monday, July 31 at the Hotel Claridge, Atlantic City, N. J., for a three-day session. More than 175 members and their wives attended the conclave, which was presided over by Roy N. McCandless of Detroit, Mich.

With mid-summer temperatures soaring and the ocean beckoning just outside the meeting-room windows, it is needless to say that the sessions were short, business-like and to the point. The opening session was featured by an address by Robert M. Creaghead of New York, N. Y., who reviewed many advantages already gained through proper publicity and advertising channels. He stated that what had been done by the association along that line was but a start, and urged the strengthening of the association's general publicity program to bring to prospective builders the advantages of the product over older forms of building.

E. W. Dienhart of the Portland Cement Assn., Chicago, spoke on the general housing market in the United States, telling the convention that, more than ever before, the matter of housing is in the public mind and that increased building is seen in the near future, with the demolition of many older-type houses. Charles P. Lower, Jr., president of Eastern Concrete Products Assn., Philadelphia, told the convention of small-house developments in Philadelphia. He made the amazing statement that in two weeks he had sold 50 low-cost houses without a single one being built. Work is being rushed with new orders coming in constantly. Joshua M. Holmes, developer of Fox Chase Manor, told the conventioneers of the amazing development of that particular tract.

H. S. Davidson, *Better Homes and Gardens,* discussed his publication's Bildcost plan, otherwise known as the "Pot of Gold" house. Several blown-up photographs of these houses were on exhibition at the convention.

On the eve of the opening session, a special broadcast and reception over radio station WPG was held at the "Home of the Century" on one of the Atlantic City piers.

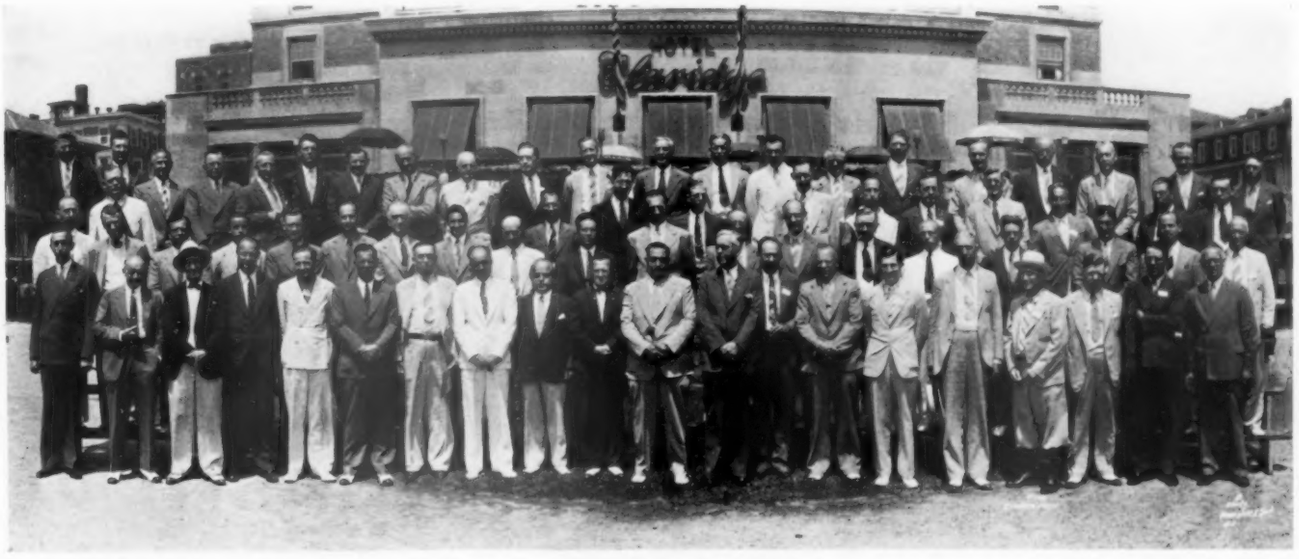
Tuesday morning, Federal housing matters occupied most of the session with a review of what Federal housing has already accomplished in the increased use of cinder products. Leo A. Kirk, director of the Federal Housing Administration of Eastern Pennsylvania and Delaware, and Wm. P. Carson, financial relations manager of the F.H.A., were the speakers. The session was presided over by Herbert A. Davis, chairman of the research committee, N.C.C.P.A. Charles A. Flanagan, chief of the Bureau of Building Inspection, Philadelphia, was introduced to the members who told of many of the problems confronting builders in the Quaker city.

During the closing session, after a complete analysis of a proposed series of fire tests, to be conducted at the Bureau of Standards, the association went on record accepting the final results of the tests. Paul M. Woodworth, Portland Cement Assn., Chicago, spoke at length on this subject before the action was taken. New fire-insurance rate will be based upon the outcome of these tests, he declared, adding that the tests would start within the next two months.

The following officers were elected: N. W. Fergerson, Roanoke, Va., president; George W. Goeitlitzer, Kansas City, Mo., and Claude B. Fellabaum, Toledo, O., vice-president; Harry Longenecker, Philadelphia, Pa., secretary-treasurer; Alvin Patterson, Baltimore, Md., assistant secretary.

The board of directors will also include Roy McCandless, Detroit, Mich., retiring president, chairman; H. A. Davis, Washington, D. C., and George Krier, Brooklyn, N. Y.

Following the election of officers a meeting place for next year was discussed, with the majority favoring a return to Atlantic City. However, the final decision will be in the hands of the board of directors.



Members of the National Cinder Concrete Products Assn. take "time out" to pose in front of the Hotel Claridge at Atlantic City during their sixteenth annual convention.

The CONCRETE MANUFACTURER

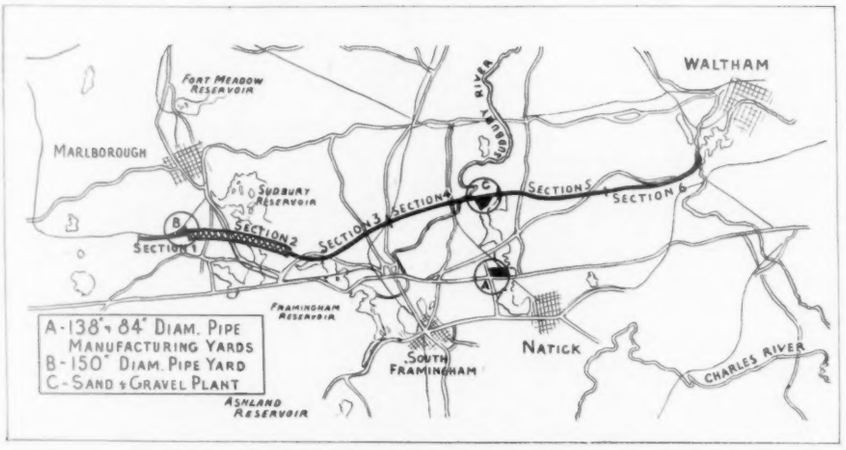
By W. E. TRAUFFER

Large-Diameter Concrete-Pipe Plants Serve Wachusett Aqueduct Project

THERE is under way at the present time in eastern Massachusetts a large construction project of unusual interest to manufacturers of concrete pipe and other concrete products. Concrete pipes up to 150 in. in diameter are being made in two plants specially built for this job. This project is the 15-mi. extension of the Wachusett Aqueduct, which will carry water to the metropolitan area of Boston, Mass. It is part of a long-range program of the Metropolitan District Water Supply Commission of that city, which includes most of the towns and cities in that area within its authority. It is being built under a P. W. A. contract, the Federal Government paying 45 per cent. of the cost. All the work is being done under the direction of the Metropolitan Water District Supply Commission, which will turn it over to the District Water Supply Commission upon completion.

Starting at the terminal chamber of the Wachusett Aqueduct this extension will consist of 10,000 ft. of 150-in. diameter pipe designed to serve under a hydraulic head of 100 ft. It will be joined to the lower section of the aqueduct by about 3 mi. of tunnel, which will carry the water under the Sudbury Reservoir at a depth of 234 ft. It is being cut through solid rock and will have an inside diameter of 14 ft. after the concrete lining has been put in place. The lower section of the aqueduct will consist of about 66,000 ft. of 138-in. diameter pipe and will have at its lower end a branch line of about 2,200 ft. of 84-in. diameter pipe. It is believed that only in the Colorado River Aqueduct have larger precast concrete pipes been used. Actual work on the Wachusett aqueduct was begun in May and is scheduled for completion in the summer of 1939.

General view of concrete plant and pouring yard at Natick.

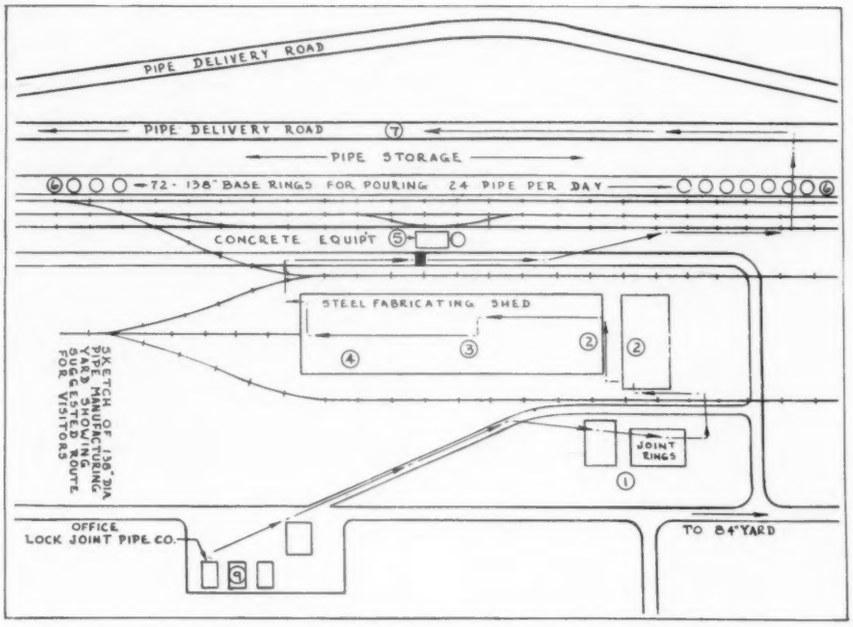


Map showing route of the aqueduct, pipe yards and aggregates plant.

Some of the finished pipe cores and cages at the Natick fabricating plant.

The contract for making and delivering the pipe for this aqueduct is held by the Lock Joint Pipe Co. of Ampere, N. J. The American Concrete & Steel Pipe Co. of Los Angeles, Cal., is fabricating the inner cylinders and steel reinforcing cages under a subcontract.

In order to fulfill its contract the Lock Joint Pipe Co. erected a plant at Framingham to produce all the sand and gravel used in manufacturing the pipes. This plant has a capacity of about 100 cu.yd. per hr. and has many interesting features which will be described in a later article. Aggregates are hauled in trucks from this plant to the two pipe plants. One of these, known as the Natick plant, is 3 mi. from the gravel plant and near Massachusetts State Highway No. 9, a superhighway, which parallels the aqueduct. The 84-in. and 138-in. pipes are made at this plant, which is at the middle point of the lower section of the aqueduct. The 150-in. diameter pipe sections are made at the Southboro plant, which is 11 mi. from the gravel plant and near the upper section of the aque-


PIPE DELIVERY ROAD
PIPE DELIVERY ROAD
PIPE STORAGE
72 - 138" BASE RINGS FOR POURING 24 PIPE PER DAY
CONCRETE EQUIP'T
STEEL FABRICATING SHED
JOINT RINGS
OFFICE
LOCK JOINT PIPE CO.
TO 84" YARD
SKETCH OF 138" DIA. PIPE MANUFACTURING YARD SHOWING SUGGESTED ROUTE FOR VISITORS

Sketch showing lay-out of the pipe-making operations.

duct where this size of pipe is being used. At present the Natick plant is manufacturing 24 sections of 138-in. diameter pipe daily and also fabricating five steel inner structures for the 150-in. pipes made at the Southboro plant.

The sizes of these pipe sections are made more clearly evident by the following table:

Inside Diam. (In.)	Wall Thickness (In.)	Outside Diameter	Length of Section (Ft.)	Weight of Section (Tons)
84	8	8 ft. 4 in.	12	15
138	11	13 ft. 4 in.	16	45 to 50
150	12	14 ft. 6 in.	12	45

Each pipe section consists essentially of a welded-steel cylinder with steel joint rings welded to it at each end. This cylinder is surrounded by two cages of reinforcing steel, the outer one being circular and the inner one slightly elliptical. This steel structure is then lined and coated with concrete to form the finished pipe. The pipe sections are made with spigots and non-flaring bells. In placing the pipe the spigot end of one section is placed in the bell end of another section and the space between the joint rings is filled by a fiber-filled lead gasket caulked from the inside of the pipe. Mortar is then placed both inside and outside to finish the joint.

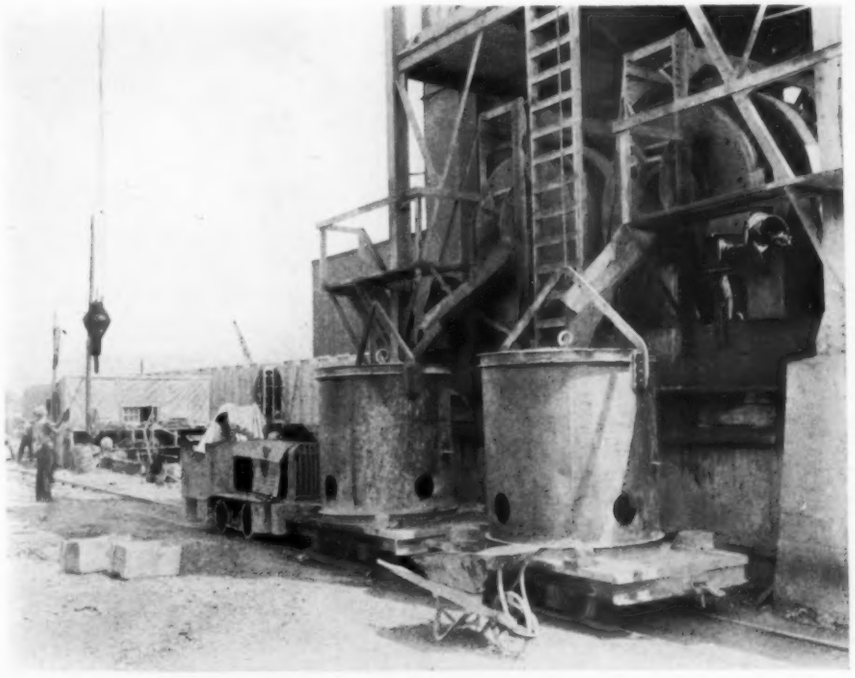
In making the joint rings bars of $\frac{5}{16}$-in. plate 10 in. and $10\frac{1}{2}$ in. wide are used. For the spigot rings bars of a special rolled shape are cut to exact length and then rolled into circles of less than the required diameter. The ends are butt-welded and the rings are then run through flanging rolls to bend in the edges to be welded to the cylinders. Next a hydraulic press stretches the steel beyond its elastic limit to the required diameter. These rings are so designed as to be self-centering with a wedge-shaped recess for caulking. The gasket is a wedge-shaped strip of lead having a fiber-filled core. After being cut to exact length the ends of the gasket are soldered together.

The steel cylinders are made from flat steel sheets. These vary in thickness from No. 10 gage to $\frac{9}{32}$ in., depending upon the pressure for which the pipe is designed. After squaring by a large power shear these plates are welded together by an automatic butt-welder. Nine sheets, each slightly over 4 ft. wide, are required to form one cylinder for the 138-in. pipe, while ten sheets are required for the 150-in. pipe. The single piece made of the welded sheets is now from 36 to 40 ft. long and 12 ft. or 16 ft. wide. A portable truck

The two 2-cu.yd. concrete mixers and batchers at the Natick plant.

moves it to the bending rolls which shape it into a cylinder. A special frame supports the cylinder as it is formed and as it is being moved to another welding mandrel, where the final seam is butt-welded.

The finished cylinder is then tipped on end and is lowered into a spigot joint ring mounted on a special holder and guide. The ring is then welded into place on the cylinder, which is next



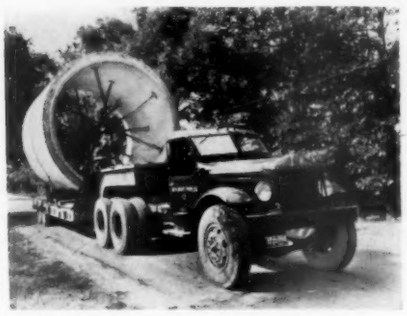
Mixers discharging into two concrete buckets. Crane hook at left.

Placing a form in position over the cylinder and reinforcing.

up-ended and lowered into a bell ring mounted on a similar holder. This is also welded to the ring by hand with an electric arc. The cylinder is then tested hydraulically under a pressure of 23,000 p.s.i. and any defects are re-welded.

The finished and approved cylinder is then carried by an overhead crane and placed in a horizontal position on the mandrel of the cage-winding machine. This machine winds the reinforcing rods spirally around the cylinder. The inner cage is wound in the form of an ellipse with its minor axis actually touching the steel cylinder. Its major axis lies in the same plane as the outer circular cage which is wound next. The minor axis of the inner cage is the vertical axis of the pipe when placed and the major axis is in the side walls where the tension is greatest.

The finished structure is then removed from the winding machine by an overhead crane, using wide slings to prevent damage to the cages. They are then placed on rollers and longitudinal steel bars are welded to both cages at about 30-in. centers. These bars make the cages more rigid and maintain the uniform spacing of the rods. The completed steel structures for the 138-in. pipe are placed on flat cars and are hauled by a locomotive crane to the pouring line. The 150-in. structures



Tractor-trailer transporting two pipe sections to the job.

are hauled by low-bed truck-trailers to the Southboro plant.

As in the fabricating of the steel, the pouring of the concrete is done with the minimum handling. Cement is received in special bulk-cement cars and is carried by a screw-conveyor to the 500-bbl. cement bin of the Heltzel central-mixing plant. Extra storage is provided by a 1,150-bbl. bin. Sand and gravel are dumped from the trucks into the hoppers, from which they are transferred separately by a bucket-elevator to 75-ton bins. The aggregates and the cement are weighed in Heltzel batchers, and batches are discharged alternately into two 56 S Ransome concrete mixers. The average mix consists

Stiff-leg derrick placing pipe in the trench.

of 1 part cement, 1.6 parts sand, and 2.5 parts gravel.

The contents of each mixer are discharged into one of two bottom-discharge concrete buckets mounted on flat cars. A gasoline locomotive moves the buckets to the place of pour. Two extra sets of buckets, cars and locomo-

Locomotive crane and concrete bucket supplying revolving hoppers over two pipe molds at Natick yard.

LEFT—Mixer, elevator and spout discharging concrete into the 150-in. pipe forms.

•

tives are on hand for use in an emergency.

It is necessary to cast 24 pieces of the 138-in. pipe daily in order to keep up with the construction schedule. Because of the time required to prepare and pour a mold and to allow it to cure enough to be moved, it is necessary to have 72 positions in which these molds can be erected. These positions are strung out in a single straight lire along the pouring track. At each position there is a cast-iron base ring embedded in concrete. The molds and the steel structure are erected on these rings and are then covered by circular steel tamping tops. The base rings and top plates hold the inner and outer forms and the steel structure in position during the placing of the concrete.

Each morning the inner and outer molds are removed from the pipe cast on the preceding day. These and the steel cylinder with reinforcing cages are placed in position on a base ring. The top is then put in place and the vertical seams in the molds are made tight. All this handling is done with a locomotive crane.

Two adjacent pipe sections are poured at one time. On the top of each is a receiving hopper which rotates slowly under its own power while the concrete is discharged through a spout into the annular space between the molds. An American locomotive crane lifts the concrete buckets from the flat car and holds them in position while the concrete is discharged into one of the hoppers. As the pouring progresses the outer mold is vibrated at high frequency by three detachable electric vibrators located on three different levels at three different points on the circumference of the outer mold. About 20 cu.yd. of concrete is required to make one of the 138-in. pipe sections.

After the pouring canvas covers are placed over the molds and moist steam is circulated around them until the following morning. The forms are then removed for re-use and canvas covers are placed over the exposed pipe sections. They are further cured with moist steam at temperatures of from 100 to 120 deg. F. until the third day, when the covers are removed. Nine steel struts are then placed inside each pipe to keep it truly circular during the final curing and until it is laid in place. A gantry crane then lifts the section from the base ring and turns it into a horizontal position after which a truck rolls it into the storage yard where it is kept moist for 12 more days.

After the curing is completed the exposed surfaces of the joint rings are coated with aluminum paint. The next step is to load the pipes for shipment. Five C. R. Jahn 16-wheel low-bed trailers of 50-ton capacity pulled by Sterling tractors with 150-hp. Cummins Diesel engines are used to haul the 138-in. pipes. A rope is wrapped around each section of pipe and attached by a cable to a Pacific hoist on an Allis-Chalmers tractor. By this means the pipe section is rolled over boards and on the trailer.

The delivery haul averages 7 mi. and each truck makes from 4 to 6 trips daily. At the job the pipes are usually rolled from the trailer by means of skids and winch-equipped tractors.

In places it is possible to drive the trailer alongside the trench. A special type of gantry derrick picks up each pipe and lowers it into place in the trench. The steel reinforcing struts are then removed. In some places, where the ground is firm, the pipes are laid on the ground. In other places they are laid on a bed of sand and gravel. Where the ground is soft and unstable a layer of concrete is poured in the bottom of the trench to prevent the pipes from floating. The method of caulking and sealing the pipe sections together has already been described.

As shown by the accompanying map the aqueduct has been divided into six sections, No. 2 being the tunnel section. Pipes must be delivered regularly to each section in sufficient numbers so that there will be no delay in laying them. The Natick plant is supplying 84-in. and 138-in. diameter pipes for sections No. 3, 4, 5, and 6. The 150-in. pipes for section No. 1 are being made at the Southboro plant, where pouring of the concrete only is done. This plant is similar to the Natick concrete plant.

Every conceivable precaution is taken to insure that the finished pipe will meet the stringent specifications. All the steel used is thoroughly tested both before and after fabrication. The same care is taken in the manufacture of the concrete. Frequent slump tests are made during the pouring of it. These tests show an average slump of between 4 and 5 in. Two concrete test cylinders are also prepared for every 5 pipes cast, one to be tested at 7 days and the other at 28 days. The average strengths to date are in excess of 4,000 p.s.i. at 7 days and 6,000 p.s.i. at 28 days.

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LEFT—Pipe section being loaded on a trailer by a tractor and winch.

The CONCRETE MANUFACTURER

By HARRY F. UTLEY

Maker of Silo Staves Cures Units in Portable, Trailer-Type Steam Rooms

PORTABLE steam -curing rooms on wheels which eliminate considerable handling of the units and do away with the usual loading, unloading and transportation of curing racks feature the new concrete-silo stave plant operated by Gale Briggs at Charlotte, Mich.

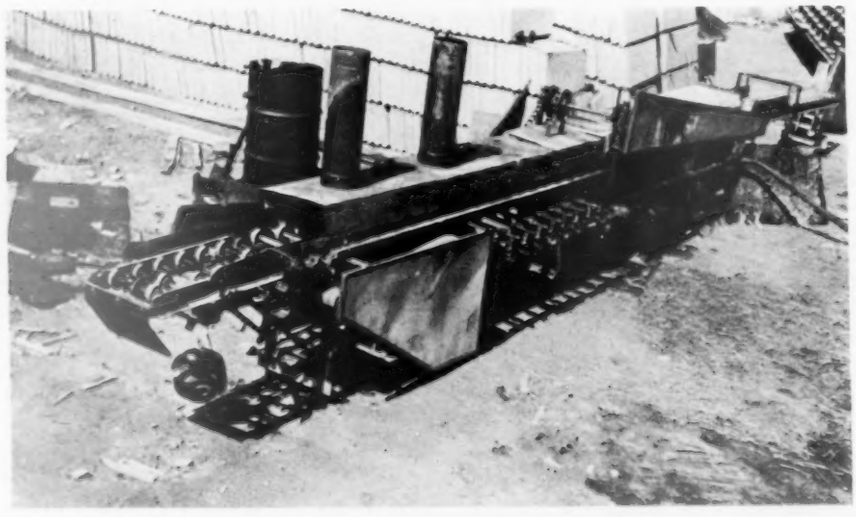
Mr. Briggs, who manufactures the staves for the Michigan Silo Co., established the plant this spring. Primarily in the trucking business (he operates 17 truck and trailer units), he had transported silo staves for the company for 5 or 6 years and last winter decided to enter the manufacturing end of the business. In this way he is able to provide considerable employment for many of his men who might otherwise be forced into idleness during slack periods. The plant adjoins the Briggs garage where the truck and trailer units are serviced.

One of the two portable curing rooms mounted on pneumatic tires. Each room has a capacity of 200 staves. Steam hose and connection may be seen at the left.

Sand and gravel are obtained from the Boichot Sand & Gravel Co., at Lansing, Mich., 20 miles distant. Temporarily they are being stored in the open but concrete storage silos are to be erected before winter sets in. They are to be equipped with steam coils to keep the aggregates dry and free-running in cold weather. The maximum size of the gravel used is 5/16 in. and the sand is extremely sharp. An elevator carries the materials to two hoppers—one for gravel and one for sand—over the mixer inside the manufacturing building. A box running on rails beneath the hoppers batches the aggregates by volume and they are then discharged into an Ideal mixer. Cement is emptied from sacks by hand.

An 18-in. inclined belt-conveyor on 15-ft. centers carries the concrete to the stave tamper which operates much as does a power tamper for concrete block. The stave molds are hollow, however, and are connected to the steam line. The concrete mixture used is quite wet and the steam-heated molds dry the surfaces just enough to prevent sticking, so that the edges of the units are clean and sharp when the mold is stripped.

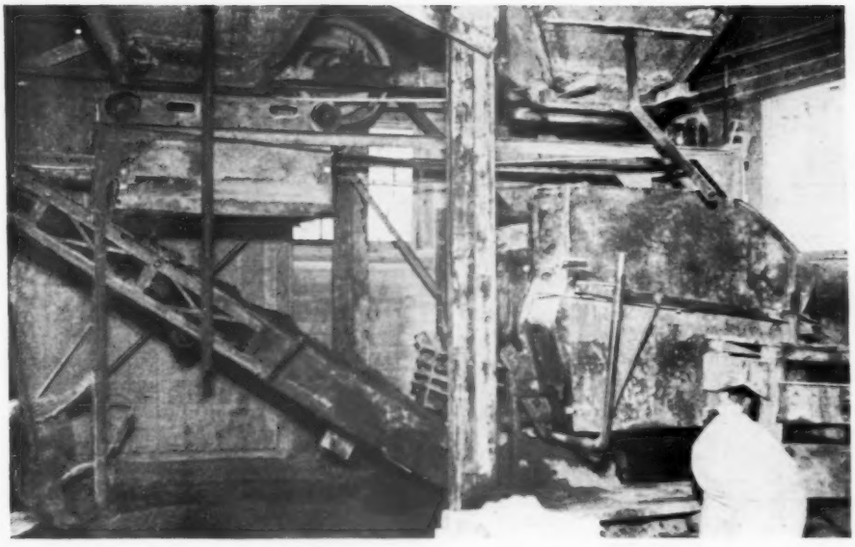
There are two portable curing rooms, each having a capacity of about 200 staves. These rooms were built on low-slung trailers mounted on four 8.25-in. by 20-in. pneumatic tires at the rear. The roofs and ends are of wood and the sides are left open for filling with the freshly-made units. They are backed into position by a tractor and, when filled, pulled out of the way. Tarpaulins are fastened at the sides, making a complete inclosure, and the steam is turned on. On a normal day's run of 400 units both curing vehicles are filled. They are allowed to remain in the steam overnight and are pulled out and unloaded in the yard the next morning, after which the production cycle again begins. At the rate of 400 units per day, Mr. Briggs expects to attain an output of at least 100,000 staves per year.



The waxing machine in which the staves are made water- and acid-proof by immersion in hot paraffin.

Standard staves are 30 in. long, 12 in. wide and 2½ in. thick. Starter staves of the same width and thickness but only 10 in. and 20 in. long are also made. All are of the tongue-and-groove design patented by the Michigan Silo Co. and are racked up in the portable kilns on cast-iron pallets. Each standard stave weighs 80 pd. and the pallet 60 pd.

After 3 or 4 weeks of yard curing, during which time they are frequently sprinkled, the staves are ready for shipment. Preceding shipment, however, they are treated with paraffin to make them waterproof and resistant to the acids which are present in ensilage.



Aggregate hoppers, batching box and the mixer. The inclined conveyor at the left carries the concrete to the stave machine.

The waxing machine consists of a roll-conveyor which passes the slabs over the paraffin which is kept hot and in a liquid state by natural-gas burners. The machine is located in the yard and the staves to be waxed are fed through it at a rate of 3 per min., being immersed to a depth of ⅜ in. for a period of 20 sec.

The waxer and slab machine are patented and built by the Michigan Silo Co., similar units being used in the concern's other plants which are located at Bloomfield, Ind., Peoria, Ill., Massillon, O., and Baltimore, Md. The portable curing rooms, however, were designed and built by Mr. Briggs and, so far as he knows, are used nowhere else.

Tamping machine in which the staves are produced. A steam-heated mold box insures clean, sharp-edged units.

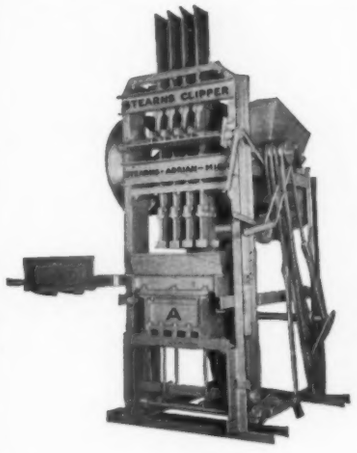
The Michigan Silo Co. is one of the leading makers of concrete-silo staves and one of the pioneers in that field. Originally located at Kalamazoo, Mich., its headquarters are now at the Bloomfield plant. Frequent tests of the product are made at the various plants. The staves must carry a load of 1,175 pounds without breaking when laid flat on 2-ft. centers. The concern has always stressed quality in its product and has earned an enviable reputation among farmers for the permanence and general satisfaction of the silos it has erected.

In July of this year Walter Brassert, president, established a fellowship for research in cement and concrete at Indiana University. The fellowship will provide for full-time research, by a graduate student in the department of chemistry, on problems peculiar to the concrete-product industry. The work will be done under the direct supervision of Dr. H. T. Briscoe, chairman of the department of chemistry.

The Elastic Stop Nut Corp., Elizabeth, N. J., announces that, in addition to its standard line of self-locking nuts, these nuts can now be furnished on order in any metal and in any combination of style, size, and thread system.

Elastic stop nuts incorporate a resilient non-metallic collar which takes up all thread play, thus establishing a constant thread contact which holds the nut in position on the bolt regardless of vibration or wear of surrounding parts. They were developed originally for pneumatic tools and other apparatus subject to heavy vibration, and are now widely used on mechanical equipment in every industry.

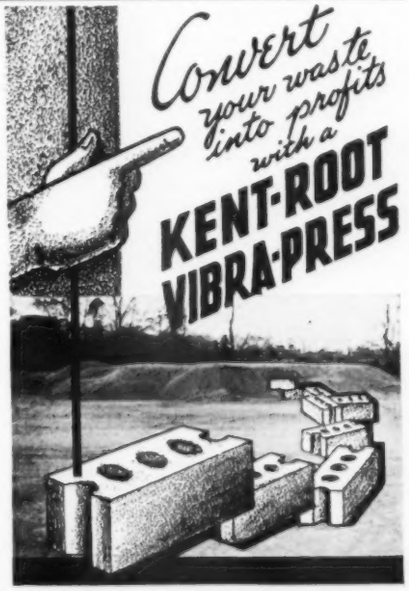
A catalog, with a graphic explanation of the "Elastic-Stop" principle and listing the standard nuts available, will be sent upon request.



The Clipper Stripper, shown above, available in 5 models, is only one of the popular machines in the ANCHOR Line of Complete Equipment for the Concrete Products Plant. ANCHOR Engineering Service in the design of new plants or revamping older operations is nationally famous. Consult us before you buy equipment or modernize your plant . . . it costs no more.

Hobbs block machines, Anchor tampers, Anchor, Jr. strippers, Stearns power strippers and Joltcrete, Stearns mixers and pallets, Straublox oscillating attachments, etc. Repair parts for: Anchor, Ideal, Universal, Stearns, Blystone mixers and many others.

ANCHOR CONCRETE MACHINERY CO.
G. M. Friel, Manager — Columbus, Ohio



Certain sizes of gravel and stone, while excellent for good fine concrete blocks, accumulate quickly in your stock piles because of little or no demand.

Why not utilize this stone and gravel by making concrete blocks?

Write Kent Machine Co. for details on this amazing way to turn waste into profit.

KENT MACHINE CO.
Cuyahoga Falls, Ohio

Ex-Football Coach (His Team Defeated Zuppke's) Now in Ready-Mix Business

New all-steel ready-mixed-concrete plant of Ireland & Lester.

AFTER graduation from the Benton Harbor, Mich., high school in 1905, where he played football for four years, Cleve Lester took over the duties as coach. In 1906 he produced the greatest football team that school has ever known, climaxing the season by defeating Muskegon high school to win the state championship. The losing team's coach was Robert H. Zuppke who has gone on to football glory as the "grand old man of the Illini"—still coaching at the University of Illinois. Mr. Lester was content to rest on his laurels, however, gave up football and entered the sand-and-gravel business with C. V. Ireland in Benton Harbor.

The two truck-mixers now in service.

Still engaged in sand-and-gravel production, the firm of Ireland & Lester recently went into the ready-mixed-concrete business. A new Butler batching plant was erected last winter on the banks of the St. Joseph River and concrete is mixed and delivered by two truck-mixers, one a Smith-Mobile, the other a Jaeger. The average haul, according to Mr. Lester, is about 2½ miles while the maximum haul—28 miles—was made a short time ago when the firm supplied concrete for a school-construction job at New Buffalo, Mich. The Ireland & Lester plant also batches concrete materials for the Yerrington-Getman Construction Co. of Benton Harbor.

The plant contains standard Butler equipment for the batching of aggregates and cement by weight, concrete being sold and delivered on specification to the Michigan Highway Department as well as for commercial, industrial, residential and municipal construction. In cold weather live steam is employed to heat the aggregates. The mixing water is also heated by steam, the water-supply line running through the larger pipe which carries steam to the aggregates hoppers.

Crushed stone and gravel are shipped in by boat and unloaded at the river dock adjoining the batching plant. The stone comes from the Sturgeon Bay, Wis., plant of the Sturgeon Bay Co. of Cleveland and the gravel from the Grand Haven, Mich., plant of the Construction Aggregates Co. of Chicago.

Sand and fine gravel are dredged from the St. Joseph River by the company. An 8-in. Morris centrifugal

These batching bins were used before the new plant went into service.

Clam-shell which handles aggregates in the yard.

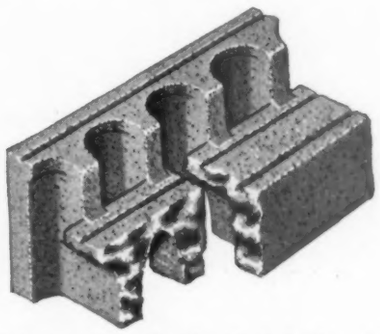
pump on the dredge is driven by a 120-hp. Buda Diesel engine. No boulders are encountered and as much as 200-cu.yd. of sand has been produced in one hour's time, Mr. Lester reports. The material is pumped to scows, three being in service on the river this season. A tugboat, powered by a 90-hp. Kahlenberg Diesel engine, tows the scows.

A new dock for the storage of dredged material is now being built about 5 miles up the river. The company also maintains offices and a supply yard on Main St. in Benton Harbor where torpedo sand, fine gravel and coal are merchandised.

• Header-Block Mold

Since the general acceptance of the concrete block as a masonry unit many years ago, the problem of providing a suitable concrete unit for tying in header courses of brick has proven a "headache" to mason and block manufacturer alike. The header block heretofore offered the mason have been more or less difficult to lay and more difficult to make.

The header block shown here is a development of engineers of Stearns Manufacturing Co., Adrian, Mich., and is made only on Stearns Joltcrete machines by the use of a special attachment, with no loose filler blocks to handle. It is made at exactly the same speed as regular blocks, and on the regular pallets.



Cut-away view of header block showing stub core holes.

As will be seen from the illustration, half cores extend the entire 8-in. depth of the block. Stub cores in the 4-in. side of the block provide the desired air space but are closed at the top to provide full mortar bed for the brick. Longitudinal grooves in this bed assure maximum mortar bond. The Joltcrete principle of vibration under pressure results in a structurally sound block having all the superior characteristics of the regular Joltcrete blocks.

• Block Machine

The Vibr-rite concrete-block machine, a new product of the Jackson & Church Co., Saginaw, Mich., produces dense, clean cut, uniform blocks of even texture having the same molecular structure throughout the entire unit. It will handle any type of aggregate and produce the full line of block required in any modern block plant, including header block, fractional block, brick, tile and manhole blocks. It uses one size pallets of either steel or wood for all units produced.

The machine consists mainly of a frame, hopper support, sliding feed hopper, mold box and stripper assembly. The frame is built of structural steel, electrically welded. There are no cams or gears, few moving parts, and these, if necessary, can be replaced inexpensively. The mold box is built up of cold rolled steel, square and true. The master pallet, on which the units are made, is chromium-plated steel. Cores are of cast aluminum with a special hard finish to withstand abrasion. The vibrating unit is enclosed in a tube running on self-aligning roller bearings, powered by a 1½-h.p. motor, running at a speed of 3600 r.p.m. with a four-step V-belt pulley allowing four different phases of vibration, controlled by a foot switch at the front of the machine, running through a magnetic starter which prevents any overheating of the motor. The eccentric-shaft speed is stepped from 6900 to 1735 frequencies, thereby allowing the use of any type of aggregate. The stripper assembly is adjustable for wood or steel pallets. The sliding feed hopper is of heavy, steel-welded construction, with a built-in cutoff for finishing the top of the blocks to a smooth and true surface. The machine requires no foundation and can be moved about at will as it weighs only 950 pounds and can be run on either 110 or 220 volts.

The machine can be operated by two men, an operator and off bearer, producing 100 to 145 block an hour, or one man can do both operations and turn out from 75 to 95 blocks an hour.

The Vibr-Rite machine comes complete with mold box to make 8-in. by 8-in. by 16-in. block and attachments for half blocks, jamb blocks, end blocks and pier or double-end blocks. An additional mold box is required to make the 12-in. by 8-in. by 16-in. blocks which comes complete with attachments to make the same special units mentioned above.

The vibration machine recently introduced.

Opens Pipe Plant

A branch plant is being established at Grand Rapids, Mich., by the Lock Joint Pipe Co. of Ampere, N. J., for the manufacture of concrete pressure pipe sections which will be laid to form a 30-mile water main running from Lake Michigan to Grand Rapids to supply the city's water needs.

The sections will be cast in 16-ft. lengths, 46 in. in diameter and 4 in. thick. Concrete will be mixed on the job and the reinforcing fabricated at the plant site. Sand and gravel will be supplied by the Grand Rapids Gravel Co., according to Henry N. Battjes, president, and will be delivered at the rate of 400 cu.yd. each day the pipe plant is in operation by trucks.

STANDARD
Wherever Concrete Pipe Are Made

R&L "CRESCENT" Pipe Molds
For Either Wet or Hand Process Manufacture

Made in any length or diameter with either Tongue and Groove, Bell and Spigot or Plain Ends.

Medium, Heavy and Extra Heavy Duty Forms for Sewers and Culverts, Well Casing, Drainage, Septic Tanks, etc.

WRITE for Catalog and Prices.

R&L CONCRETE MACHINERY CO.
Kendallville, Indiana.
For more than 35 years makers of dependable concrete pipe molds and pipe machines.

SEVEN MATERIALS IN ONE BIN?

"You Bet—this new BLAW-KNOX plant accurately measures and loads aggregates, cement, and water into truck mixers."

Blaw-Knox Truck Mixer Loading Plants include overhead storage bins for aggregates and cement; accurate Weighing Batchers for aggregates, cement and water; arranged for manual or automatic operation; complete conveyors for handling materials from cars or trucks to bins, when desired—all properly designed and built to your requirements as an efficient unit for truck mixer loading. See Blaw-Knox Catalog No. 1582.

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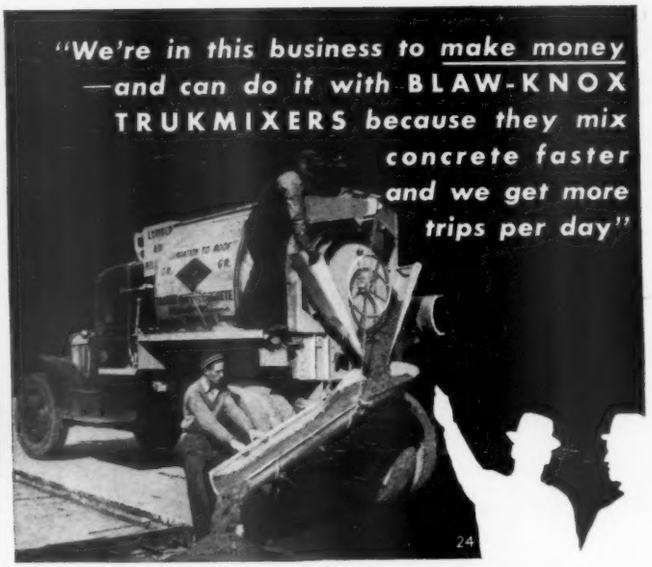
BLAW-KNOX BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.

TRUCK MIXER LOADING PLANTS



"We're in this business to make money —and can do it with BLAW-KNOX TRUKMIXERS *because they mix concrete faster and we get more trips per day"*

24

It's a comfortable feeling to have truck mixers working for you that perform 100% under all conditions. No breakdowns—no worries.

You make a *profitable investment* when you buy Blaw-Knox Trukmixers and agitators. Write for Catalog No. 1582.

BLAW-KNOX BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.

Agitators and TRUKMIXERS

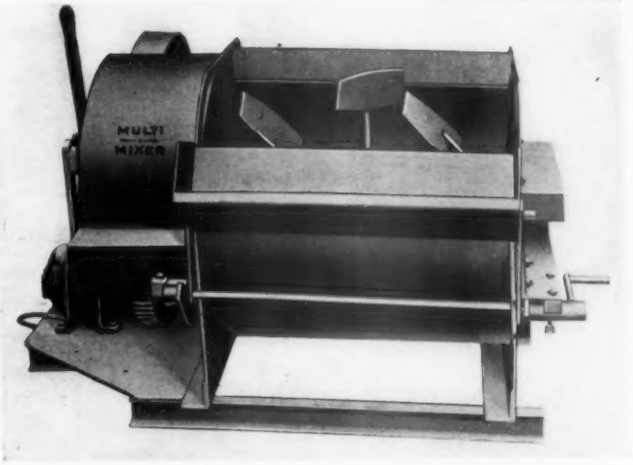
Multiplex

A Good Line to **BETTER PROFITS** in Concrete Blocks

NEW DESIGN MULTI-MIXER

TAMPERS

HAND PRESS MACHINES



POWER PRESSES

VARIABLE SPEED VIBRATION MACHINES

Here's the "Ace of Mixers," designed throughout to combine *high speed* concrete mixing with record low cost production. Reverse paddle action mixes any kind of aggregate twice as fast with less liner friction. Minimum power and maintenance requirements. Can be had in gear drive, belt or V-belt drive either end or side discharge. Six sizes.

Time-tested Equipment

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The *Multiplex* CONCRETE MACHINERY CO., ELMORE, OHIO

Increases Putty Plant Capacity

Fifteen months after Jahncke Service, Inc. placed a Brooks-Taylor lime putty plant in operation in New Orleans, La., they increased its capacity by installing three additional ageing tanks. Why not add lime mortar to your line? Write for information on the Brooks-Taylor process.

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Plants at BIRMINGHAM, CHICAGO & GREENVILLE, PA.

Only Jaeger Truck Mixers Give You These Features...

- DUAL-MIX ACTION produces higher strength concrete—as proved by the Hollister Tests !
- THROW-BACK BLADES — essential to fast, thoro mix. Only Jaeger has them !
- DUAL-REVOLVING WATER SPRAYS — fastest water distribution; sprays to both ends of drum !
- SYPHO-METER TANK — insures accurate water control !
- VACUUM CAB CONTROL of shock-proof, 2-speed transmission — choice of truck engine or separate engine drive !
- COR-TEN STEEL — lighter, stronger, resists both rust and abrasion !

Send for new catalog showing why Jaeger Truck Mixers far outsell all others.

THE JAEGER MACHINE CO.

602 DUBLIN AVE., COLUMBUS, OHIO

Another Progressive Bulk Product Firm "Goes More Modern" via Marietta

5 "Profit Item" Reasons Why They Installed Marietta Concrete Bins

1—Stop Material Waste.
2—Remove Fire Hazard.
3—Stop Bin Depreciation.
4—Lighten Labor and Cost.
5—Add to Plant Appearance.

Pictured here are 2 Marietta Concrete Storage Bins—for storing dry processed clay. Recently installed at Georgia plant of a progressive Ohio Paper Company. Haydite Staves used—for superior thermal insulation qualities. . . *Built-to-endure*, to owner's *special* needs, these Bins surely provide storage facilities that meet Marietta's "5-point profit chart". . . . Write for "Concrete Facts," on storage systems that pay high returns.

THE MARIETTA CONCRETE CORP.
MARIETTA, OHIO
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MARIETTA CONCRETE STORAGE SYSTEMS

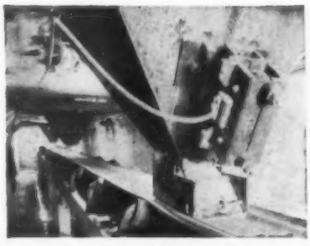
MOVE MATERIAL *the Easy Way--* *"BY CONTROLLED VIBRATION"*

Electro-Magnet
VIBRATORS

Make the most stubborn bins and chutes flow freely

8 models—ranging from 4 lbs. to 500 lbs. in weight

Each with separate power control panel



Three crushed stone hoppers fitted with 75 lb. vibrators.

Three 20 ton Feeders controlling mix to cement plant ball mill.

Electro-Magnet
VIBRATORY FEEDERS

Provide rheostat control of volume flow of bulk materials, to grinders, mixers, dryers, screens, etc.

From pounds to tons per hour

Also—Scale Controlled
VIBRATORY WEIGH FEEDERS

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385 N. Lexington Ave. **Homer City, Pa.**

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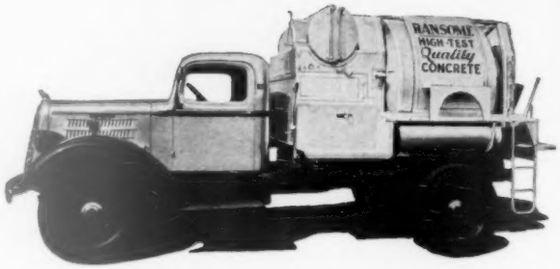
DO YOU WISH TO PRODUCE A HIGHER QUALITY CONCRETE?



and at no additional expense. Then allow us to prove to you beyond any question of a doubt how the patented mixing action of a

Ransome TRUCK MIXER

will not only produce a superior mix but greatly increase the number of trips per day.

Send for the Facts

RANSOME CONCRETE MACHINERY CO.
DUNELLEN NEW JERSEY

"COMMERCIAL" CORED *Steel* PALLETS

Will not Break, Crack, Warp

Cost is low when life production is considered.

Made for tampers and vibrators.

Prospective block producers should carefully check their machine and pallet costs before investing.

Free air circulation, full rack car capacity, easy to handle, no excess weight to lift.

Strong—rigid—accurate core box fit.

Ask your equipment dealer or send for catalogue

The COMMERCIAL SHEARING & STAMPING COMPANY
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Block Plants Everywhere Are Adopting This New Fog Nozzle

Produces an ideal foggy mist for curing . . . easily tapped into pipe-lines.

- Efficient
- Inexpensive
- Troubleproof

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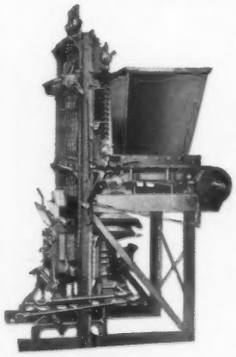
Heltzel
BUILDS IT BETTER

A HELTZEL Portable 100 ton—3 compartment Batcher Plant for charging either batch trucks or truck mixers. Bulletin S-18.

HELTZEL STEEL FORM & IRON CO. WARREN, OHIO, U.S.A.

Miles CONCRETE EQUIPMENT

THE WINNER By MILES in QUALITY PRODUCTION



For DEPENDABLE SERVICE year in and out, select MILES CONCRETE EQUIPMENT for larger production of HIGH QUALITY products at a lower first cost and operating cost.

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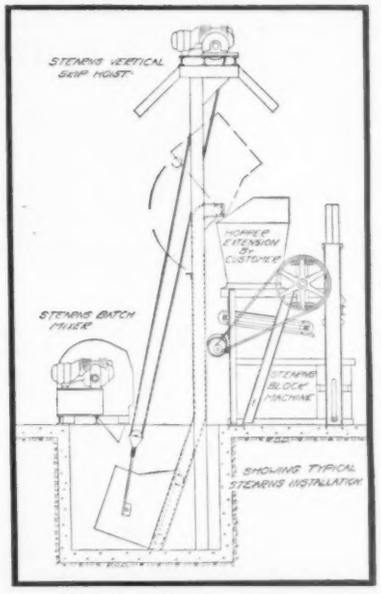
THE MILES MANUFACTURING CO.
Dept. 165
JACKSON, MICHIGAN

Stearns Clipper makes faced blocks at low cost



Complete Concrete Products Plant Equipment—Power Strippers, Clipper Strippers, Mixers, Skip Loaders, Brick Machines, Manhole Block Machines and Straub Oscillating Attachments.

—readily converted for stripper blocks

Here's a low-cost down-face machine for the production of building blocks with special facing material—plain, rock, panel and other designs, in fulls, fractionals, single and double corner, for 4, 8, 10 and 12 in. wall thickness.

Substitution of different mold box, tamp feet and stripping device converts the machine to a stripper.

Write for complete details and price of this general-purpose machine.

Six Important Features

Rigid end mold box—welded steel construction—large air-space cores—quick acting finisher plate—"pull easy" core operating device—alternate 8-bar tamping.

STEARNS MANUFACTURING CO. - ADRIAN, MICH.

GENE OLSEN, PRESIDENT

While still one of the leading producers of tamp equipment, Stearns is also a pioneer in vibrating block machines—manufacturers of Stearns Jolt-crete, fully protected by patents issued and pending.

BIG OPPORTUNITIES

MANUFACTURING MATERIALS FOR LOW COST BUILDING

OPPORTUNITY COMPLETE, READY-MADE FOR YOU IN YOUR LOCALITY—One that is proven—ready for you to cash in on the great building upturn under way. It includes the essentials upon which sound and successful business enterprises are established.

SUPERIOR PRODUCT, LOW COST PRODUCTION—You will produce a material nearly 20% lighter in weight—A product capable of meeting all known building requirements—One accepted by Government and City Building Departments—Requiring 20% less material—Made by line production machines.

EARNING POWER AND FUTURE—Present DUNBRIK-DUNSTONE Manufacturers already point the way for you. Some are selling output at 100% over cost. Others are getting as high as 80% of the brick business.

WE EQUIP YOU WITH LINE PRODUCTION MACHINERY—Large Production—only one or two men. Equipment costs but fraction of other processes of equal capacity. Franchise granted covering your locality—protecting your market, business and future.

INVESTIGATE NOW—Send for "4 Keys to Success." It tells the complete story—How present manufacturers are making outstanding progress in this new industry—One that offers unlimited opportunity for growth, expansion and profit. Write today.

BETTER MATERIAL AT LOWER COST

Countless numbers of new homes, apartments and structures for business and industrial purposes are needed today. Government, industry, business, financial institutions and municipalities—all are combining to speed up this needed construction. They actually are paving the way and assuring a market for the man equipped to supply the enormous demand in his territory for building materials.

Your product will be permanent, fire and termite proof—in a full range of beautiful colors, shades and textures. Improved design cuts construction costs to the level of frame—and with factory-to-job delivery, offers new standard of service to building trade in your community.

W. E. DUNN MFG. CO. 420 W. 24TH ST., HOLLAND, MICHIGAN

The CONCRETE MANUFACTURER

THE LOUISVILLE CEMENT PROCESS INCLUDES THE TYPE "L" DRYER!

Louisville Drying Machinery Co. research has recently developed a drying technique by which dry-process cement plants can be changed to the wet process, *without any change of kilns.*

Part of the new Louisville technique hinges on the use of the patented Type L Louisville Dryer—a dryer of such advanced design that it has made spectacular improvements in the drying of many organic and inorganic materials.

We would welcome an opportunity to describe this unique equipment to you. Your inquiry will bring a descriptive bulletin—but *no* high-pressure salesmanship. *Address:* Louisville Drying Machinery Co., *Incorporated,* 435 Baxter Avenue, Louisville, Kentucky.

No Troublesome, Leaky Hatch to Open, Close and Keep Clean!

SMITH-MOBILE gives you the fastest loading cycle in the industry. It actually saves about two-thirds of the time required by old style truck mixers for the complete loading cycle. Here's why:

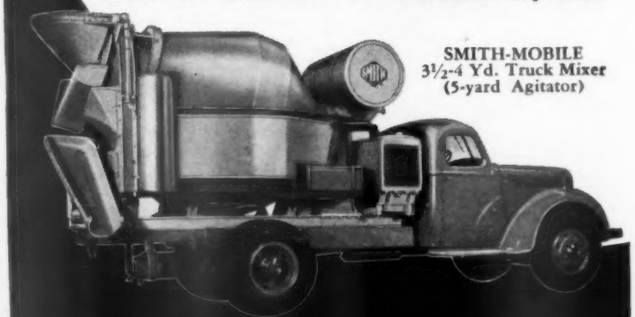
Old style truck mixers lose valuable time while driver climbs out of cab, stops drum, climbs on top of mixer, opens hatch, climbs down, gets into cab and drives mixer under the bin. After the mixer is loaded, the above process must be repeated in reverse with the additional operation of cleaning the edges of the hatch so it can be closed.

SMITH-MOBILE eliminates all these tedious operations. Standard equipment includes a big, roomy feed chute, easy to spot under bin gates. Driver can remain in cab. When mixer is loaded, he drives to the job immediately, with no delays for the unnecessary operations enumerated above. This means more loads per day—GREATER PROFITS.

Since the drum revolves during the charging operation, mixing and shrinking of batch start instantly, greatly increasing the load capacity. And don't forget, Smith-Mobile's HIGH DISCHARGE permits steeper and longer distributing spout . . . discharges directly into high forms. No hoist or ramp required.

Write for Smith-Mobile literature.

The T. L. SMITH COMPANY
2887 N. 32nd St. • Milwaukee, Wis.



SMITH-MOBILE
3½-4 Yd. Truck Mixer
(5-yard Agitator)

SMITH-MOBILE
THE *Modern* TRUCK MIXER and AGITATOR

Safety is ALWAYS the first consideration

Wherever explosives are used, the most important thing is safety—first, last, and always. With Atlas Manasite Detonators, considerations of safety become—not less important, but *more effective*.

Through materially reduced sensitivity to impact and friction, Atlas Manasite Detonators lessen the possibility of accidents from inadvertent mishandling. Reports from the field show that Atlas Manasite Detonators have resisted accidental firing in many cases where other types of caps might be expected to detonate.

Atlas Manasite Detonators provide *greater assurance of safety*—with no loss in detonating efficiency—and no increase in price!

Another "ATLAS FIRST"

ATLAS MANASITE DETONATORS

ATLAS POWDER COMPANY, WILMINGTON, DEL.

Cable Address—Atpowco

Everything for Blasting

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Chicago, Ill.	Los Angeles, Calif.	Picher, Okla.	San Francisco, Calif.	Wilkes-Barre, Pa.
Denver, Colo.	Memphis, Tenn.	Pittsburg, Kansas	Seattle, Wash.	

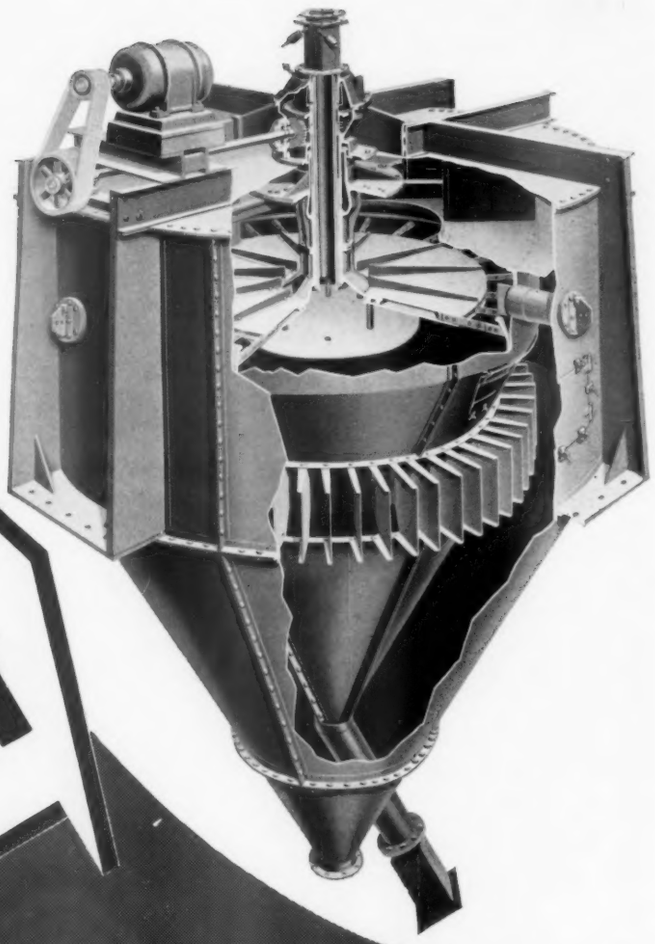
ATLAS

EXPLOSIVES

CHEMICALS ATLAS EXPLOSIVES

DOUBLE WHIZZER Air SEPARATOR

RAYMOND for CEMENT



FINENESS — Adjustable within wide limits of 1600 to 2700 surf. area

UNIFORMITY — Close particle size control for any degree of classification

CAPACITY — Large increases in capacity with double whizzer separator

ECONOMY — Decided reductions in operating and maintenance costs

TO the Raymond Mechanical Air Separator goes the distinction of having the longest period of engineering development, dating from 1887 when the Raymond air separating principle was introduced to industry.

Its latest feature . . . the double whizzer . . . has won recognition of the Raymond Separator as the most advanced type of centrifugal classifier today, capable of precision performance in meeting modern specifications.

RAYMOND for CEMENT . . . is definitely the consensus of judgment among producers who know what the Double Whizzer Separator is doing in the production of "high early" grades . . . the results show in the close control of particle sizes, maximum surface areas, and ultimate strength tests on the finished product.

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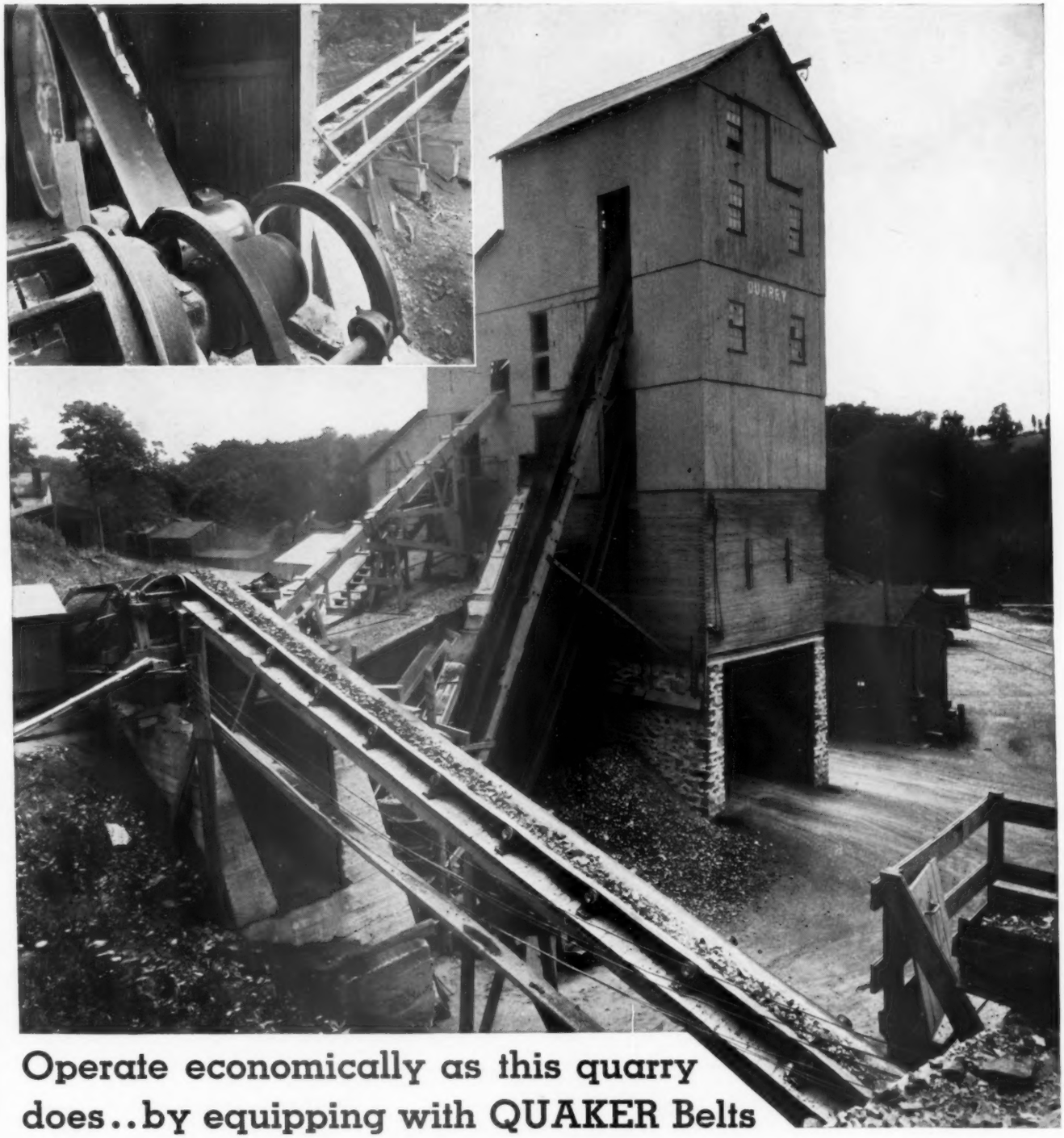
COMBUSTION ENGINEERING COMPANY, INC.
1321 North Branch Street **CHICAGO**
Sales Offices in Principal Cities • • • In Canada: Combustion Engineering Corporation, Ltd., Montreal



Operate economically as this quarry does..by equipping with QUAKER Belts

This quarry, located in Central Pennsylvania, handling thousands of tons of crushed rock annually, depends on Quaker belts to insure economical operation.

The conveyor, 125' long, is a 24" 5-ply Quaker belt; the drive is our Hi-10-S1 12" 6-ply transmission belt.

Quaker engineers know conveying and transmission conditions; they can specify a belt that will prove economical for you to use.

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OVER 50 YEARS OF CONSISTENT QUALITY

PHILADELPHIA · ***NEW YORK*** · ***CHICAGO*** · ***HOUSTON*** · ***SAN FRANCISCO***

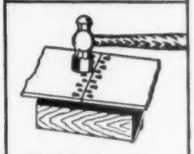
Now,—simple, quick repairs for heaviest CONVEYOR BELTS

Merely butt the two belt ends together over a block of soft wood, hammer in the Bristol's Steel Belt Fastener, turn belt over and clinch points—and there you have a good, tight, smooth repair or joint that will last as long as the belt.

No tearing, working loose or coming out. For all conveyor and power belts of every material and every thickness. Bulletin 72-5W.

THE BRISTOL COMPANY
Mill Supply Div. *WATERBURY, CONN.*
Branches in principal cities

1 Hammer through.


2 Clinch points.

3 Conveyor belt repairs now easy, quick, low-cost.

BRISTOL'S
TRADE MARK REG. U. S. PAT. OFF.
STEEL BELT FASTENERS

ROUGH ON ROCKS

American Hammermills and Ringmills "give the works" to the toughest rocks—they take on all comers regardless of size or hardness. AMERICAN reduces 10 to 100 tons of material per hour—*continuously*—gives a finely graded, uniform product.

AMERICAN Crushers have one soft side—for your pocket-book. Power requirements and maintenance are kept at rock bottom. You can rely upon an AMERICAN for maximum economy in crushing operations.

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SYMONS CRUSHERS • SCREENS

FINER PRODUCT
GREATER CAPACITY
LOWER CRUSHING COST

These advantages have made Symons Cones first among reduction crushers.

SIZES CLOSER
SAVES HEADROOM
ACTION IS POSITIVE

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NORDBERG MFG. CO., MILWAUKEE WISCONSIN

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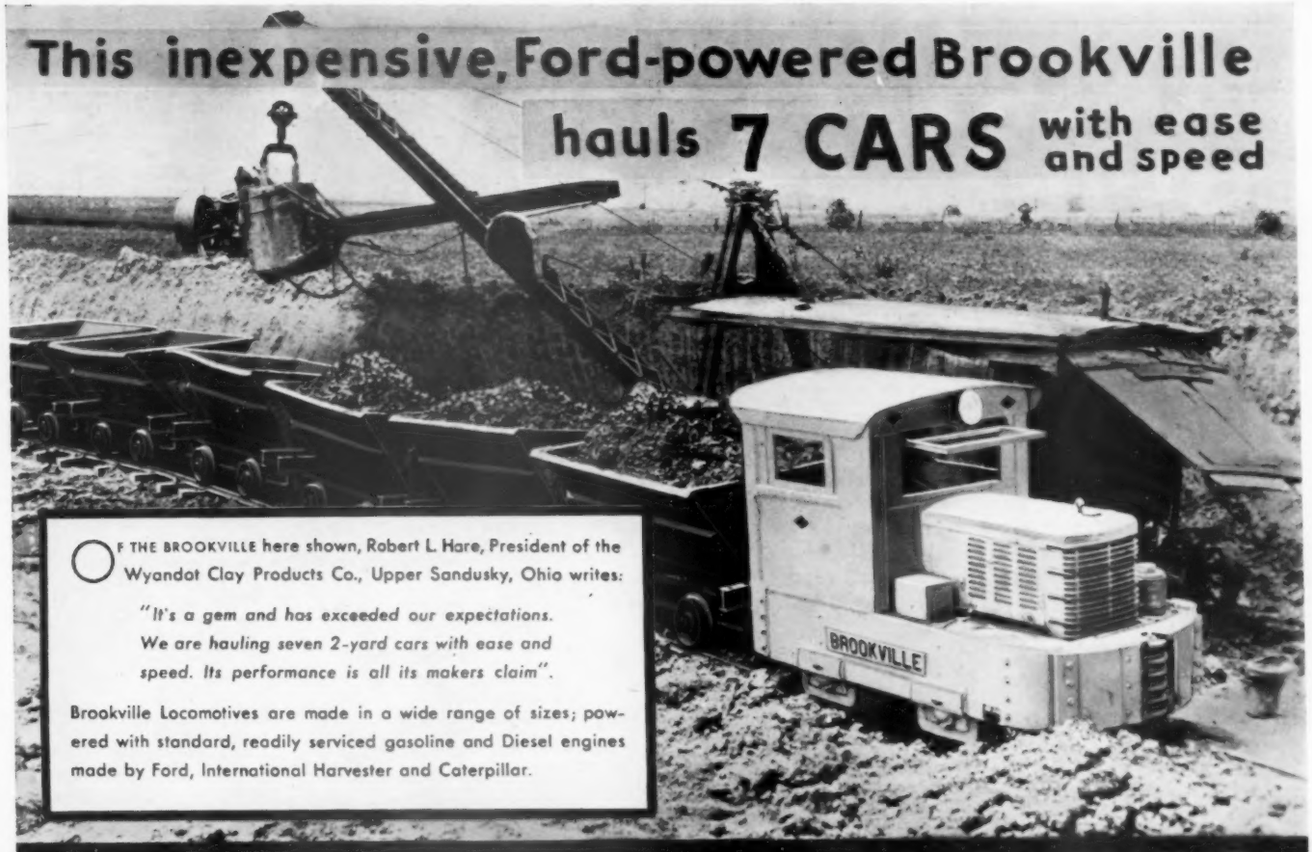
600 ROOMS each with bath from $2.50 up

Lounge and Restaurants *Unrestricted Parking to 3 A.M.*

This inexpensive, Ford-powered Brookville hauls 7 CARS with ease and speed



OF THE BROOKVILLE here shown, Robert L. Hare, President of the Wyandot Clay Products Co., Upper Sandusky, Ohio writes:

"It's a gem and has exceeded our expectations. We are hauling seven 2-yard cars with ease and speed. Its performance is all its makers claim".

Brookville Locomotives are made in a wide range of sizes; powered with standard, readily serviced gasoline and Diesel engines made by Ford, International Harvester and Caterpillar.

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Write for Literature descriptive of quality chassis built to meet your operating requirements.

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MILWAUKEE, WIS.
Factory Branches in Principal Cities

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified.

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*Robins Conveying Belt Co.
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National Powder Co.

Caps (Blasting, Electric)
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National Powder Co.

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*General Electric Co.
*Westinghouse Electric & Mfg. Co.

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*Koehring Co.
*Le Tourneau, Inc., R. G.

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*Link Belt Co.
*Multiplex Concrete Machinery Co.

Cars (Brick Hardening Metal)
Jackson & Church Co.

Castings
*Eagle Iron Works
Frog, Switch & Mfg. Co.
*Hardinge Co.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
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*Jaeger Machine Co.
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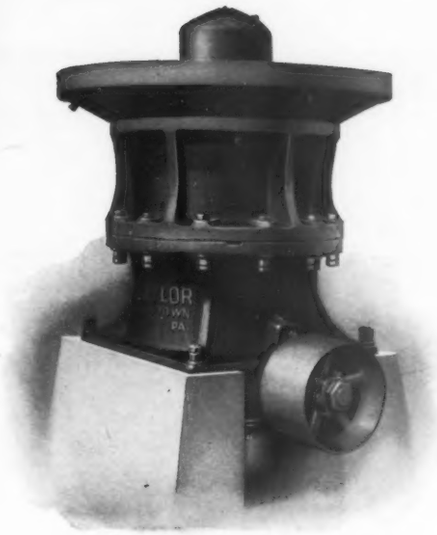
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
*McLanahan and Stone Corp.
Sprout, Waldron & Co.

*See also detail information in the 1939 Pit and Quarry HANDBOOK.



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an owner of a TRAYLOR *TY REDUCTION CRUSHER complains*

He formerly operated an ordinary, so-called reduction crusher, and had much trouble to secure enough business because he was short on fine sizes. Since he changed over to a TY, he has come to dominate his locality, and bemoans the fact that he cannot get rock to the crusher fast enough. Our Bulletin 2112 explains the whys and wherefores of such experiences. Write for a copy today!

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Cost of Installation
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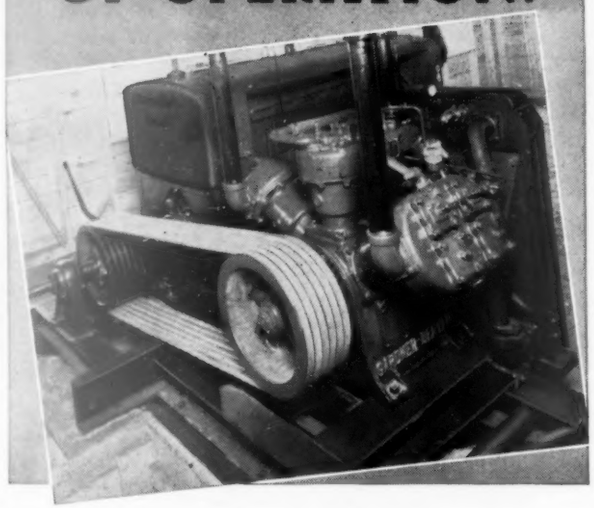

● In Quebec, a Gardner-Denver "WBH" Compressor, with "Caterpillar" Diesel drive, has been in operation for 2½ years—running on an average of two 8-hour shifts a day. Thus far, *only 20 minutes* working time has been lost on account of repairs—and the repairs cost $1.20. Fuel and lubricating costs for the 2½ years' period have averaged only 55c per hour.

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S I N C E 1 8 5 9

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Smidth & Co., F. L.
Sprout, Waldron & Co.

Circuit Breakers and Testers
*General Electric Co.

Classifiers
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Lewistown Foundry & Machine Co.
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*Nordberg Mfg. Co.
Simplicity Engineering Co.
Straub Mfg. Co.

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*Roebling's Sons Co., John A.

Clutches
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

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*Hardinge Co.
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*Raymond Pulverizer Division of the Combustion Engineering Co.
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*Williams Patent Crusher & Pulverizer Co.

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*Koehring Co.

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*Chicago Bridge & Iron Co.
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Republic Rubber Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

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*Diamond Iron Works
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Jackson & Church Co.
*Jeffrey Mfg. Co.
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*Barber-Greene Co.
*Diamond Iron Works
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*Blaw-Knox Co.
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*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.
*Westinghouse Electric & Mfg. Co.

Cranes (Crawler and Locomotive)
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
Harnischfeger Corp.
Industrial Brownhoist Corp.
*Koehring Co.
*Lima Loco. Works
*Link-Belt Co.
Marion Steam Shovel Co.
Northwest Eng. Co.
Thew Shovel Co.

Cranes (Electric Traveling)
Industrial Brownhoist Corp.

Cranes (Overhead)
Harnischfeger Corp.
Industrial Brownhoist Corp.

Crusher Parts
*American Pulverizer Co.
Frog, Switch & Mfg. Co.
*Jeffrey Mfg. Co.
McLanahan and Stone Corp.
*Traylor Engr. & Mfg. Co.

Crushers (Cone)
*Nordberg Mfg. Co.

Crushers (Hammer)
*American Pulverizer Co.
*Dixie Machy. Mfg. Co.
*Jeffrey Mfg. Co.
Straub Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Jaw and Gyratory)
Bacon, Inc., Earle C.
*Diamond Iron Works
*Jeffrey Mfg. Co.
Lewistown Foundry & Machine Co.
*McLanahan and Stone Corp.
New Holland Machine Co.
*Nordberg Mfg. Co.
Smith Engr. Works

*See also detail information in the 1939 Pit and Quarry HANDBOOK.

Straub Mfg. Co.
*Traylor Engr. & Mfg. Co.

Crushers (Ring)
*American Pulverizer Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Roll)
*American Pulverizer Co.
*Diamond Iron Works
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
*Robins Conveying Belt Co.
Straub Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Rotary)
*American Pulverizer Co.
Jackson & Church Co.
New Holland Machine Co.
*Williams Patent Crusher & Pulverizer Co.

Crushing Rolls
Frog, Switch & Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
Straub Mfg. Co.
*Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Cutter Heads (Dredging)
*Eagle Iron Works

Detonators
Atlas Powder Co.
National Powder Co.

Diaphragms (Rubber)
Quaker City Rubber Co.

Diesel Engines (See Engines—Diesel)

Dipper Parts
Frog, Switch & Mfg. Co.

Dippers and Teeth (Power Shovel)
*Bucyrus-Erie Co.
Frog, Switch & Mfg. Co.
*Koehring Co.

Dragline Cableway Excavators
*Bucyrus-Erie Co.
*Link-Belt Co.
*Sauerman Bros., Inc.

Dragline Excavators
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
Harnischfeger Corp.
Industrial Brownhoist Corp.
Jackson & Church Co.
*Koehring Co.
*Lima Loco. Works
*Link-Belt Co.
Marion Steam Shovel Co.
Northwest Eng. Co.
Thew Shovel Co.

Draglines (Walking)
*Bucyrus-Monighan Co.

Dredges
*Bucyrus-Erie Co.
Hetherington & Berner, Inc.
*Morris Machine Works

Driers
*Chicago Bridge & Iron Co.
*Hardinge Co.
Jackson & Church Co.
Lewistown Fdry. & Machine
*Link-Belt Co.
Louisville Drying Machy. Co.
McCarter Iron Works, Inc., The
McLanahan & Stone Corp.
*Traylor Eng. & Mfg. Corp.
Tyler Co., W. S.

Drill Bit Reconditioning
*Bucyrus-Erie Co.

Drill Bits
*Bucyrus-Erie Co.

Drill Sharpening Machinery
*Bucyrus-Erie Co.
Gardner-Denver Co.

Drilling Accessories
*Bucyrus-Erie Co.
Gardner-Denver Co.

Drilling Contractors
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Blast-Hole)
*Bucyrus-Erie Co.
Gardner-Denver Co.

Drills (Core)
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Diamond)
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Drifting)
Gardner-Denver Co.

Drills (Hand—Hammer)
Gardner-Denver Co.

Drills (Rock)
Gardner-Denver Co.
*Jeffrey Mfg. Co.

Drills (Sinking)
Gardner-Denver Co.

Drills (Stoping)
Gardner-Denver Co.

Drills (Wagon)
*Bucyrus-Erie Co.
Gardner-Denver Co.

Drills (Water Well)
*Bucyrus-Erie Co.

Drills (Well) (See Drills—Blast-Hole)

Drives (Multiple Belt, Chain, Rope)
*Link-Belt Co.
*Westinghouse Electric & Mfg. Co.

Dust Arresters
*Blaw-Knox Co.
Ducon Company, The
*Research Corp.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Collecting Systems
*Blaw-Knox Co.
Ducon Company, The
McCarter Iron Works, Inc., The
*Raymond Pulverizer Division of the Combustion Engineering Co.
*Research Corp.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Conveying Systems
*Blaw-Knox Co.
Ducon Company, The
*Fuller Company
*Research Corp.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Filters
Ducon Company, The
*Sly Mfg. Co., W. W.

Dynamite (See Explosives)

Dynamos
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Electric Cables (See Cables—Electric)

Electrical Equipment
*General Electric Co.

Electrodes (Welding)
Stulz-Sickles Co.

Elevator Belting (See Belting)

Elevator Buckets (See Buckets—Elevator and Conveyor)

Elevators (See Conveyors and Elevators)

Eliminators (Soft Stone) (See Soft Stone Eliminators)

Engineers
Bacon, Inc., Earle C.
*Fuller Company
Hetherington & Berner, Inc
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Smidth & Co., F. L.
Sprout, Waldron & Co.
*Traylor Engr. & Mfg. Co.
*Westinghouse Electric & Mfg. Co.

Engine Generator Sets
See Generator Sets (Engine).

Engines (Diesel)
Caterpillar Tractor Co.
Cummins Engine Co.
National Supply Co. of Del.
*Nordberg Mfg. Co.
Superior Diesel Engine Div. of The National Supply Co.

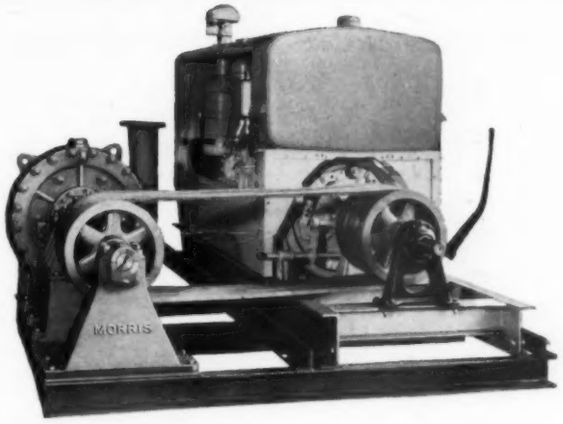
Engines (Internal-Combustion)
Caterpillar Tractor Co.
Cummins Engine Co.
National Supply Co. of Del.
*Nordberg Mfg. Co.
Superior Diesel Engine Div. of The National Supply Co.

Engines (Steam)
*Morris Machine Works
*Nordberg Mfg. Co.

* See also detail information in the 1939 Pit and Quarry HANDBOOK.

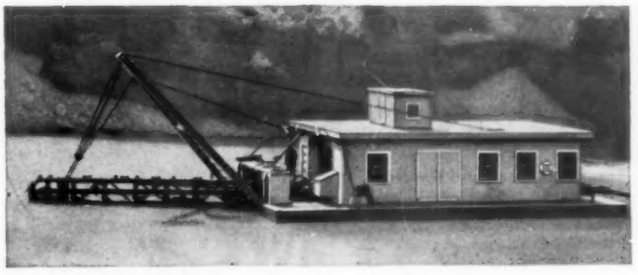
The MORRIS HYDRAULIC COLUMN

News of interest to Centrifugal Pump Users



Completeness in sand-pumping outfits . . .

This heavy-duty sand pump was furnished with flap valve, rock trap, suction hood and numerous elbows—all designed and built by Morris. When you need pumping or dredging equipment, remember that the Morris line includes more than twelve different types of high-efficiency centrifugal pumps for every conceivable material-handling requirement, complete hydraulic dredge hulls, and a wide range of dredging pump accessories. You are safe when you come to Morris for Centrifugal Pumps and Dredges.



Confounding the skeptics . . .

The favorite job of the Morris Engineers is to prove how often the "impossible" is possible in pumping operations. Many are the instances in which Morris Pumps are developing "impossible" efficiencies, handling "impossible" mixtures, operating under "impossible" conditions, and lasting "impossibly" long. Morris Dredges, too, are successfully solving problems of sand and gravel production that have stumped previous attempts at solution. If you have a difficult pumping or dredging problem don't give it up, give it to the Morris engineers. They'll give you the answer.

MEMBER

For authoritative recommendations on any pumping or dredging problem, write Morris Machine Works, Baldwinsville, N. Y. Export Office: 30 Church St., New York, N. Y.

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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Link-Belt Co.

Excavators—Shallow Grading (Bucket Elevator Type)
*Haiss Mfg. Co., Geo.

Explosives
Atlas Powder Co.
National Powder Co.

Fabricating (Electric Arc and Oxy Acetylene)
Stulz-Sickles Co.

Fans (Exhaust)
*General Electric Co.
*Jeffrey Mfg. Co.

Feed Water Heaters
*Westinghouse Electric & Mfg. Co.

Feeders
*Diamond Iron Works
*Fuller Company
*Hardinge Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McCarter Iron Works, Inc., The
*McLanahan and Stone Corp.
*Merrick Scale Mfg. Co.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.
Straub Mfg. Co.
Syntron Co.
*Traylor Engr. & Mfg. Co.
*Westinghouse Electric & Mfg. Co.

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Gardner-Denver Co.

Freezing & Thawing Cabinets
Sodeman Heat & Power Co.

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*General Electric Co.

Fuse Cutouts
*General Electric Co.

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Atlas Powder Co.
*Ensign-Bickford Co.
National Powder Co.

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*Westinghouse Electric & Mfg. Co.

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*Westinghouse Electric & Mfg. Co.

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*Cincinnati Rubber Mfg. Co.
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Republic Rubber Co.

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Gates (Bin) (See Bin Gates)

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*Haiss Mfg. Co., Geo.
*Link-Belt Co.

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*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Gears (Herringbone)
*General Electric Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.
*Westinghouse Electric & Mfg. Co.

Gears and Pinions
*General Electric Co.
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.
*Westinghouse Electric & Mfg. Co.

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Generator Sets (Engine)
*General Electric Co.
National Supply Co. of Del.
Superior Diesel Engine Div. of The National Supply Co.
*Westinghouse Electric & Mfg. Co.

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*General Electric Co.
Syntron Co.

Generator Sets (Turbine)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

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Lewistown Foundry & Machine Co.

Grab Buckets (See Buckets—Clamshell, Orange - Peel, etc.)

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Owen Bucket Co.

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*Blaw-Knox Co.
*Hendrick Mfg. Co.

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*Link-Belt Co.
*Traylor Engr. & Mfg. Co.

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*Hendrick Mfg. Co.
Lewistown Fdry. & Mach. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
*Robins Conveying Belt Co.
Smith Engr. Works

Guards (Wire)
Manganese Steel Forge Co.

Guns (Hydraulic)
Hetherington & Berner, Inc.
Taylor Forge & Pipe Works

Hammer Mills (See Crushers—Hammer)

Hand Operated Stripper Machines
Miles Mfg. Co.

Haulage Systems (Electric)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Heaters (Bitumen)
McCarter Iron Works, Inc., The

Hoists
Commercial Shearing & Stamping Co.
Gardner-Denver Co.
Harnischfeger Corp.
Hetherington & Berner, Inc.
Industrial Brownhoist Corp.
Jackson & Church Co.
*Jaeger Machine Co.
*Jeffrey Mfg. Co.
McLanahan and Stone Corp.
*Sauerman Bros., Inc.
Smith Engr. Works
Sprout, Waldron & Co.

Hoppers
*Chicago Bridge & Iron Co.
*Hendrick Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
McCarter Iron Works, Inc., The

Hose (Air, Steam and Water)
*Cincinnati Rubber Mfg. Co.
Quaker City Rubber Co.
Republic Rubber Co.

Hose (Fire and Suction)
Quaker City Rubber Co.

Hose (Radiator-Engine Cooling)
Quaker City Rubber Co.
Republic Rubber Co.

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Humidifiers
Sodeman Heat & Power Co.

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Idlers
*Barber-Greene Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.

Indicators (Material Level)
*Fuller Company

Indicators (Recording Instruments)
Bristol Co.

Instruments (Electrical)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Insulation (Electric)
*General Electric Co.

Joist and Slab Machines (Concrete)
R and L Concrete Machy. Co.

Kilns and Coolers (Rotary)
*Chicago Bridge & Iron Co.
*Hardinge Co.
*Link-Belt Co.
Louisville Drying Machy. Co.
McCarter Iron Works, Inc., The
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Kilns (Vertical)
*Chicago Bridge & Iron Co.
*Hardinge Co.

Kominuters
*Smidth & Co., F. L.

Ladders (Agitating Dredge)
*Eagle Iron Works

Ladders (Hydraulic Dredge)
*Eagle Iron Works

Lighting
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Lights (Flood)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Lime and Hydrating Plants
*Chicago Bridge & Iron Co.
*Hardinge Co.

Lime-Handling Equipment
*Chicago Bridge & Iron Co.
*Fuller Company
*Hardinge Co.
Jackson & Church Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Raymond Pulverizer Division of the Combustion Engineering Co.
*Robins Conveying Belt Co.
*Traylor Engr. & Mfg. Co.

Lime Kilns
*Chicago Bridge & Iron Co.
*Hardinge Co.

Lime Plants (Comp.)
*Hardinge Co.

Lime Putty Plants
*Chicago Bridge & Iron Co.

Linings (Ball- and Tube-Mill) (See Mill Liners and Linings)

Loaders and Unloaders
*Barber-Greene Co.
*Bucyrus-Erie Co.
*Fuller Company
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Locomotives (Diesel)
*Brookville Locomotive Co.
Davenport Loco. Works
Plymouth Loco. Works Div. of the Fate-Root-Heath Co.
*Westinghouse Electric & Mfg. Co.

Locomotives (Diesel-Electric)
Davenport Loco. Works
*General Electric Co.
Plymouth Loco. Works Div. of the Fate-Root-Heath Co.
*Westinghouse Electric & Mfg. Co.

Locomotives (Elec., Gas, Steam)
*Brookville Locomotive Co.
Davenport Loco. Works
*General Electric Co.
*Lima Loco. Works
*Westinghouse Electric & Mfg. Co.

Locomotives (Gas-Electric)
Davenport Loco. Works
*General Electric Co.
Plymouth Loco. Works Div. of the Fate-Root-Heath Co.
*Westinghouse Electric & Mfg. Co.

Locomotives (Oil-Electric)
Davenport Loco. Works
*General Electric Co.
Plymouth Loco. Works Div. of the Fate-Root-Heath Co.
*Westinghouse Electric & Mfg. Co.

Locomotives (Storage Battery)
Davenport Loco. Works
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Locomotives (Trolley Battery)
Davenport Loco. Works
*General Electric Co.
*Jeffrey Mfg. Co.

Magnetic Pulleys (See Pulleys, Magnetic)

Magnets
*General Electric Co.

Manganese Steel
Frog, Switch & Mfg. Co.
Manganese Steel Forge Co.

Manganese Steel (Plates and Sheets)
Manganese Steel Forge Co.

Manganese Steel Castings
Frog, Switch & Mfg. Co.

Material Handling Equipment
Syntron Co.

Measuring Devices (Electric)
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Mechanical Rubber Goods
*Cincinnati Rubber Mfg. Co.
Quaker City Rubber Co.
Republic Rubber Co.

Meters
*General Electric Co.
*Westinghouse Electric & Mfg. Co.

Mill Liners and Linings
*Hardinge Co.
*Jeffrey Mfg. Co.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Mills (Ball, Tube, etc.)
*Hardinge Co.
*Traylor Engr. & Mfg. Co.

Mills (Grinding) (See also Crushers—Hammer)
*American Pulverizer Co.
*Hardinge Co.
Jackson & Church Co.
*Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
*Raymond Pulverizer Division of the Combustion Engineering Co.
*Smidth & Co., F. L.
Sprout, Waldron & Co.
Straub Mfg. Co.
*Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Mills (Pug)
McCarter Iron Works, Inc., The

Minerals Separation (Cement) (See Cement Minerals Separation)

Mixers (Asphalt)
Hetherington & Berner, Inc.
*Link-Belt Co.
McCarter Iron Works, Inc., The
*Warren Bros. Roads Co.

Mixers (Concrete)
Anchor Concrete Machy. Co.
*Kent Machine Co.
*Link-Belt Co.
Miles Mfg. Co.
*Multiplex Concrete Machinery Co.
*Stearns Mfg. Co.

*See also detail information in the 1939 Pit and Quarry HANDBOOK.

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The first cement plant in the United States, designed from the start for closed-circuit wet raw material grinding, is MERRICK equipped, as shown in the illustrations above. Capacity is 5,400 bbls. daily, any type of cement required.

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Tough handling jobs merely prove the better construction of Industrial Brownhoist Clamshells. They stay on the job in spite of all kinds of punishment and emphasize the importance of our forty years experience in the design and building of buckets that boost production and reduce costs.

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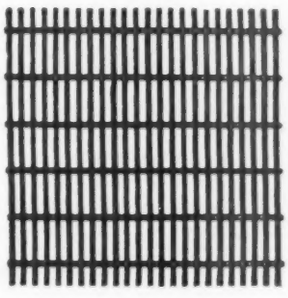
INDUSTRIAL BROWNHOIST CORPORATION, BAY CITY, MICHIGAN
District Offices: New York, Philadelphia, Pittsburgh, Cleveland, Chicago



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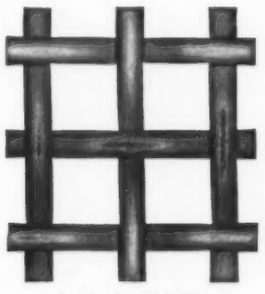
A wire cloth of guaranteed accuracy backed by fine workmanship and an effort to satisfy.

Available in Square Mesh and Rolled Slot. A trial will convince you of the superiority.



2 Mesh .162 Ga.

THE CLEVELAND WIRE CLOTH & MFG. COMPANY
574 E. 78th St. CLEVELAND, OHIO

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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Motors and Generators
*General Electric Co.
Harnischfeger Corp.
Syntron Co.
*Westinghouse Electric & Mfg. Co.

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*General Electric Co.
*Westinghouse Electric & Mfg. Co.

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Moulds and Forms (Concrete)
Anchor Concrete Machy. Co.
Dunn Mfg. Co., W. E.
*Kent Machine Co.
*Multiplex Concrete Machinery Co.
R and L Concrete Machy. Co.
*Stearns Mfg. Co.

Netting (Locomotive Stack)
*Tyler Co., W. S.

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White Showers, Inc.

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*Deister Concentrator Co.

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Nozzles (Spray)
*Deister Concentrator Co.
*Link-Belt Co.
White Showers, Inc.

Outdoor Lighting Equipment
*General Electric Co.

Packings
*Cincinnati Rubber Mfg. Co.
Quaker City Rubber Co.
Republic Rubber Co.

Pallets
Anchor Concrete Machy. Co.
Commercial Shearing & Stamping Co.
*Multiplex Concrete Machinery Co.
*Stearns Mfg. Co.

Pans (Wet and Dry)
Jackson & Church Co.

Paving Mixers
*Jaeger Machine Co.
*Koehring Co.

Perforated Metal Plates
Chicago Perforating Co.
*Hendrick Mfg. Co.
*Sprout, Waldron & Co.
Standard Stamping & Perf. Co.

Photo-Electric Cells
*Westinghouse Electric & Mfg. Co.

Pipe, Dredge (Floating and Shore)
*Chicago Bridge & Iron Co.
Frog, Switch & Mfg. Co.
Naylor Pipe Co.
Taylor Forge & Pipe Works

Pipe Flanges
Frog, Switch & Mfg. Co.
Hetherington & Berner, Inc.
Naylor Pipe Co.
Taylor Forge & Pipe Works

Pipe Fittings
Hetherington & Berner, Inc.

Pipe Forms (Concrete)
*R and L Concrete Machy. Co.

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*R and L Concrete Machy. Co.

Pipe (Spiral)
Naylor Pipe Co.
Taylor Forge & Pipe Co.

Pipe (Water, Gas, Low Pressure Steam)
Hetherington & Berner, Inc.

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*Chicago Bridge & Iron Co.
Naylor Pipe Co.
Taylor Forge & Pipe Co.

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*Barber-Greene Co.
*Fuller Company
Haiss Mfg. Co., Geo.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Portable Crushing and Screening Plants
*Barber-Greene Co.
*Diamond Iron Works
*Jeffrey Mfg. Co.
*Link-Belt Co.
*McLanahan and Stone Corp.
*Williams Patent Crusher & Pulverizer Co.

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Miles Mfg. Co.

Power Shovels (See Shovels, Electric, Internal-Combustion and Steam)

Power Stripper Machines
Miles Mfg. Co.

Power Tampers (Concrete)
Anchor Concrete Machy. Co.
*Kent Machine Co.
Miles Mfg. Co.
*Multiplex Concrete Machinery Co.
*Stearns Mfg. Co.

Power Units (Internal Combustion)
Caterpillar Tractor Co.
Cummins Engine Co.
National Supply Co. of Del.
*Nordberg Mfg. Co.
Superior Diesel Engine Div. of the National Supply Co.

Precipitators
*Research Corp.
*Western Precipitation Corp.

Pre-formed Wire Rope
Broderick & Bascom Rope Co.
*Hazard Wire Rope Division of the American Chain & Cable Co.

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Anchor Concrete Machy. Co.
*Kent Machine Co.
*Multiplex Concrete Machinery Co.
*Stearns Mfg. Co.

Presses (Brick & Block)
Jackson & Church Co.

Proportioning Equipment
*Blaw-Knox Co.
Heltzel Steel Form & Iron Co.
Jackson & Church Co.
*Jaeger Machine Co.
*Merrick Scale Mfg. Co.
Schaffer Poidometer Co.

Pulleys
*Link-Belt Co.
*McLanahan and Stone Corp.
Sprout, Waldron & Co.

Pulleys (Magnetic)
Sprout, Waldron & Co.

Pulleys (Wing)
Sprout, Waldron & Co.

Pulverized Fuel Systems
*Hardinge Co.
*Raymond Pulverizer Division of the Combustion Engineering Co.

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*American Pulverizer Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
Lewistown Foundry & Machine Co.
New Holland Machine Co.
*Raymond Pulverizer Division of the Combustion Engineering Co.
*Smidth & Co., F. L.
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Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

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*Fuller Company

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*Westinghouse Electric & Mfg. Co.

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*Fuller Company

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*Morris Machine Works
*Smidth & Co., F. L.

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Hetherington & Berner, Inc.
*Jaeger Machine Co.
Kansas City Hay Press Co.
*Morris Machine Works
*Westinghouse Electric & Mfg. Co.

Pumps (Dewatering)
*Morris Machine Works

Pumps (Dredging)
Bucyrus-Erie Co.
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
*Morris Machine Works

Pumps (Sand and Gravel)
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
*Morris Machine Works

Pumps (Turbine)
*Morris Machine Works

Pumps (Vacuum)
*Fuller Company

Pumps (Vertical)
*Morris Machine Works

Pumps (Well)
*Morris Machine Works

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*Kent Machine Co.
*Multiplex Concrete Machinery Co.
*Stearns Mfg. Co.

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*General Electric Co.

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Heltzel Steel Form & Iron Co.
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*General Electric Co.

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*Traylor Engr. & Mfg. Co.

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Stulz-Sickles Co.
*Westinghouse Electric & Mfg. Co.

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*Jeffrey Mfg. Co.
*Link-Belt Co.
*McLanahan and Stone Corp.

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*Hardinge Co.
Jackson & Church Co.

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*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Simplicity Engineering Co.
Smith Engr. Works

Sand-Settling Tanks
*Chicago Bridge & Iron Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Nordberg Mfg. Co.
Smith Engr. Works

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*Merrick Scale Mfg. Co.

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*Link-Belt Co.
*Sauerman Bros., Inc.

Scrapers (Wagon)
*Bucyrus-Erie Co.

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Bacon, Inc., Earle C.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
*Deister Concentrator Co.
*Deister Machine Co.
*Diamond Iron Works
*Eagle Iron Works
Frog, Switch & Mfg. Co.
*Haiss Mfg. Co., Geo.
*Hardinge Co.
*Hendrick Mfg. Co.
Industrial Brownhoist Corp.
*Jeffrey Mfg. Co.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
Ludlow-Saylor Wire Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
*Nordberg Mfg. Co.
*Robins Conveying Belt Co.
*Roebling's Sons Co., John A.
Simplicity Engineering Co.
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Sprout, Waldron & Co.
Standard Stamping & Perf. Co.
Straub Mfg. Co.
*Traylor Engr. & Mfg. Co
Twin City Iron and Wire Co.
*Tyler Co., W. S.

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*Deister Concentrator Co.
*Deister Machine Co.
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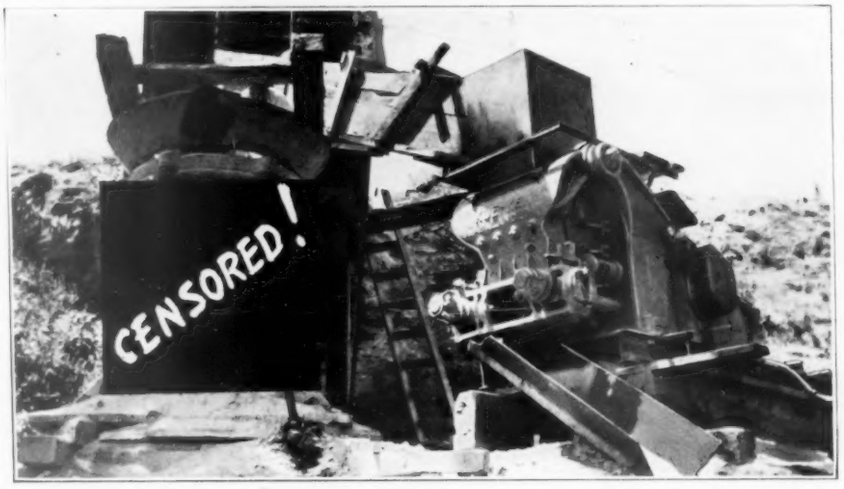
*See also detail information in the 1939 Pit and Quarry HANDBOOK.

CUT CRUSHING COSTS!

HERE'S HOW ONE KUE-KEN OPERATOR IS DOING IT

The previous crusher shown at the left is a well-known gyratory weighing 36,000 lbs. With a feed of hard river gravel 2 to 6 inch size and jaws set at 1½", the best it could do was 20 tons an hour. This made a product 50% plus 1½" which had to be screened and recrushed. Operating in the hot sun this crusher had to shut down every 3 hours to cool off. It also required setting up closer every day to compensate for wear. The owner reports that with his KUE-KEN (shown at the right) weighing only 11,500 lbs., he crushes 50 tons an hour with ⅝" jaw setting. This makes a real cubical product 95% minus 1". The KUE-KEN runs cool all day and the jaws are at their original setting after several weeks operation.



Complete description of several sizes of cost cutting KUE-KEN crushers are given in Bulletin 600. Your copy gladly sent on request.

STRAUB MFG. CO.

528 CHESTNUT ST.
OAKLAND, CALIF.

PADDLE LOG TYPE

"DOUBLE **EAGLE** VALUE"

Gravel **WASHERS** Sand

SPIRAL SCREW TYPE

EAGLE WASHERS

SINGLE SCREW TYPE

Screw sizes: 15" to 24".

Tub sizes: 24" x 12' to 33" x 15'.

Capacity: 25 to 65 cu. yds. per hour; 35 to 100 tons per hour.

DOUBLE SCREW TPYE

Screw sizes: 18" to 24".

Tub sizes: 57" x 12' to 60" x 15'.

Capacity: 60 to 130 cu. yds. per hour; 90 to 200 tons per hour.

Specify Eagle Washers for efficient and economical washing of aggregates in sand and gravel production. Pioneered by Eagle Iron Works and developed through years of building and installation experience—the many exclusive and patented features make Eagle Washers the "best bet" where rigid specifications require superior equipment.

Prominent highway commissions recognize Eagle Washer superiority, as attested by hundreds of letters on file.

Eagle Spiral Screw Washers effectively remove all foreign material of lighter specific gravity than the aggregate, such as sticks, silt, mud balls and shale.

Eagle Paddle Log Type Washers are specially adapted for the removal of plastic, tough clay balls and cemented conglomerate where greater cutting and abrading action is required.

Ask for Catalog

EAGLE IRON WORKS

129 HOLCOMB AVENUE DES MOINES, IOWA

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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*Stearns Mfg. Co.

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***Fuller Co.**
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***Jaeger Machine Co.**
McCarter Iron Works, Inc., The
*Merrick Scale Mfg. Co.
Schaffer Poidometer Co.

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Welding & Cutting Equipment.
*General Electric Co.
Stulz-Sickles Co.
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Stulz-Sickles Co.

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Stulz-Sickles Co.

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Harnischfeger Corp.
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Jackson & Church Co.

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***Jeffrey Mfg. Co.**
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***Robins Conveying Belt Co.**
Sprout, Waldron & Co.

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Cleveland Wire Cloth & Mfg. Co.
Ludlow-Saylor Wire Co.
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***Roebling's Sons Co., John A.**
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Worm Gears (See Gears and Pinions)

*See also detail information in the 1939 Pit and Quarry HANDBOOK.

HAUL AT LOWEST COSTS

with DAVENPORT INDUSTRIAL LOCOMOTIVES

Because Davenport Industrial Locomotives embody the best of modern locomotive practices, they insure easier and faster haulage with complete dependability. That means lower costs and increased profits throughout an exceptionally long service life.

There is a size and type of Davenport exactly suited to your needs—2½ to 100 tons. Meet your haulage problems the Davenport way. Our engineers will gladly analyze your requirements and submit dependable recommendations without the slightest obligation. DAVENPORT LOCOMOTIVE WORKS, Davenport, Iowa.

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DAVENPORT LOCOMOTIVE WORKS

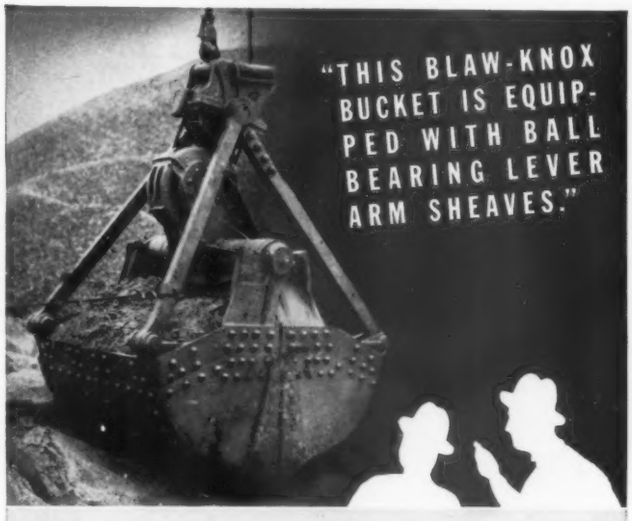
GASOLINE • DIESEL • STEAM
DIESEL ELECTRIC • GAS ELECTRIC

EFFICIENT *Screening* PAYS DIVIDENDS

● Link-Belt Vibrating Screens assure exact and careful screening, in greater volume at lower cost. The vibration is uniformly distributed and maintained, mechanically. The screen cloth surface is entirely unobstructed—no "dead" areas. Low in first cost—low in maintenance—an economical screen to operate. It is a triumph of mechanical vibration. Send for Book No. 1562.

Link-Belt Company, Philadelphia, Chicago, Indianapolis, Atlanta, San Francisco, Toronto, or any of our offices, located in principal cities. 7671

LINK-BELT *Vibrating* SCREENS



As a matter of fact this feature is standard equipment and does not cost more. It is especially desirable where the bucket handles loose granular materials because it keeps lubrication in and dirt out. This and many other desirable features of Blaw-Knox Buckets is fully described and illustrated in Bulletin No. 1606. Write for it today.

17

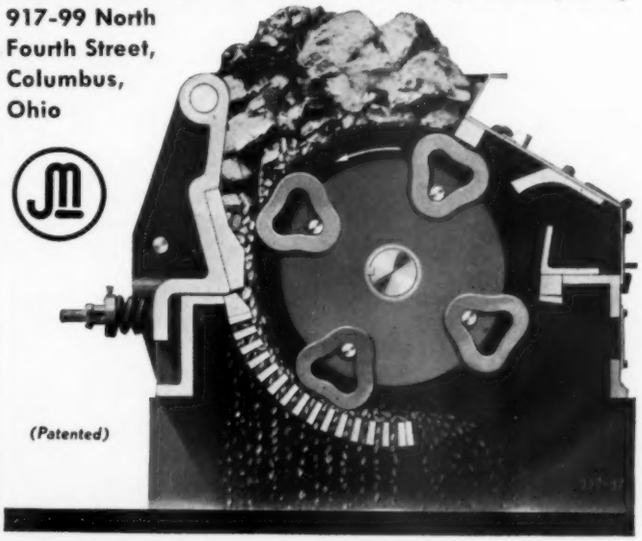
BLAW-KNOX *Digging and Rehandling* BUCKETS
BLAW-KNOX DIVISION • OF BLAW-KNOX CO. • Farmers Bank Bldg. Pittsburgh, Pa.

MANY YEARS OF DEPENDABLE SERVICE . . .

Jeffrey crushers, pulverizers and shredders will give you many years of economical and dependable service. The rotary ring type crusher (illustrated) is designed especially for reduction of shale, lime, cores and many other similar materials. Has renewable steel rings, all-welded steel frame, roller bearings and other features to provide genuine utility and low-cost performance. Write.

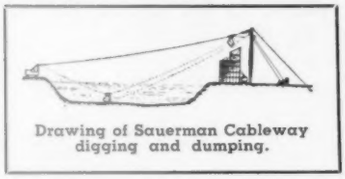
Reduction Division

The Jeffrey Manufacturing Company
917-99 North Fourth Street, Columbus, Ohio



(Patented)

Dig, Lift, Haul & Dump



Drawing of Sauerman Cableway digging and dumping.

with a SAUERMAN SLACKLINE CABLEWAY

ALL over the world, sand and gravel producers, both large and small, have found that the Sauerman Slackline Cableway is "made to order" for their excavating problems.

This machine is able to reach across a river, pond or pit—dig to the bottom of any deposit either in dry ground or under water—and move the excavated materials in a straight line to the top of a screening plant at a rapid rate.

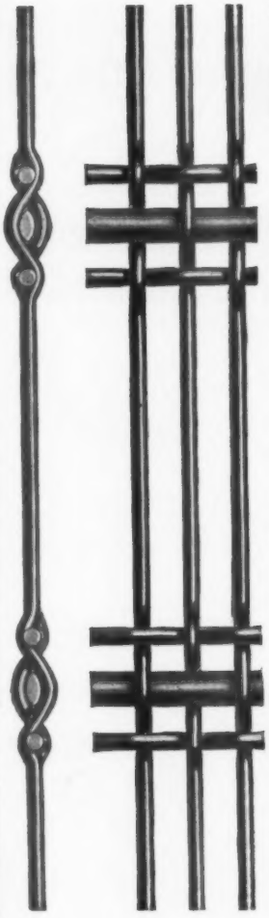
The one machine does everything; no rehandling of material by conveyors and elevators. The saving is considerable both in capital cost and operating charges.

Pictured above is a 2-cu. yd. Sauerman machine supplying gravel to a 125-ton per hour washing plant.

•

Catalog giving data on all Sauerman Long Range Machines mailed on request.

SAUERMAN BROS., INC., 434 S. Clinton St., CHICAGO



STA-TRU

Long-Mesh Woven Wire Screens

made to work under tension and vibration.

The straight stay - bars carry ALL the tension. The crimps in the round wires can not be stretched or broken. The screen can not be caused to sag or split by the pull of the tensioning device.

LUDLOW-SAYLOR

WIRE CO. ST. LOUIS

"M" IS FOR McCARTER

Always a CAPITAL Name

In Asphalt Mixing Plants

A solid, enduring reputation for technical and ethical reliability—that is the greatest structure ever "Designed and Erected by McCarter." The continued success of many Asphalt Mixing Plants, engineered, fabricated and installed throughout the country is a tribute to McCarter leadership in asphalt paving plant equipment.

Engage our services, and you will agree with four generations of our clients: "McCARTER BUILT Means *EXTRA* VALUE RECEIVED."

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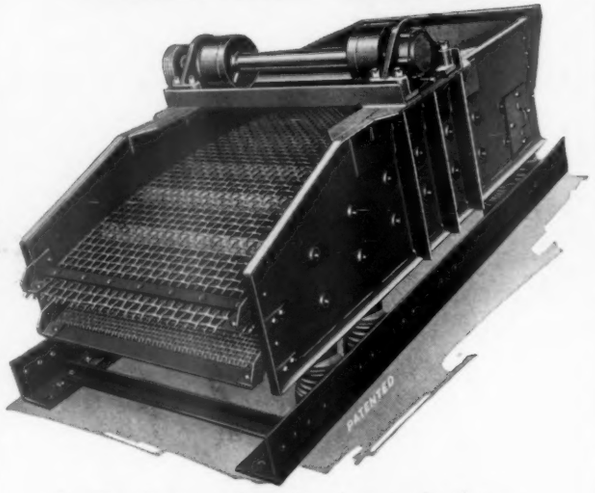
Designers and Manufacturers Uninterruptedly since 1827

THE McCARTER IRON WORKS, INC.

NORRISTOWN PENNSYLVANIA

DEISTER PLAT-O VIBRATING SCREEN

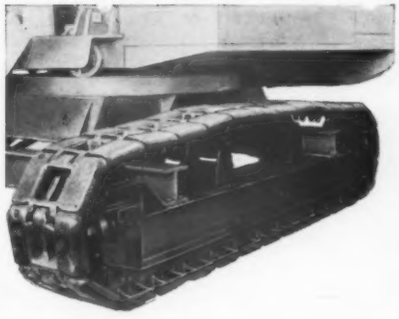


1. Simple powerful vibrating mechanism.
2. Screen cloth automatically held under uniform tension.
3. Any one screening surface changed without disturbing remaining decks.
4. Cushioned vibration.

DEISTER MACHINE CO.

1933 E. WAYNE ST. FT. WAYNE, IND.

Getting IN–AROUND--and OUT *easily is important*–



—a BAY CITY feature meaning

LOW-COST YARDAGE

The BAY CITY design provides for fast, easy travel and steering under full power in either direction by simply applying pressure on cone clutches that operate brakes—no stopping to set jaw clutches or brakes—no blocking—and all controls in easy reach of operator. Interested?

Write for Catalog H-3

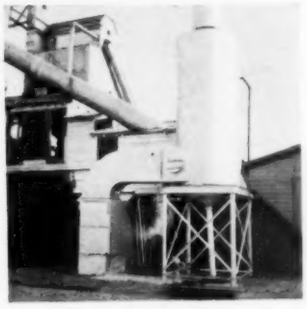
BAY CITY SHOVELS, Inc., Bay City, Michigan

BAY CITY SHOVELS

DUCON

AIR and GAS WASHERS

Give 99% + Dust Recovery



This shows the modern Ducon Cyclone Air Washer and Dust Collector installed in the asphalt plant of McGuire & Rolph, Washington, D. C. This unit handles all the dust from the dryers for this 1000-ton capacity plant.

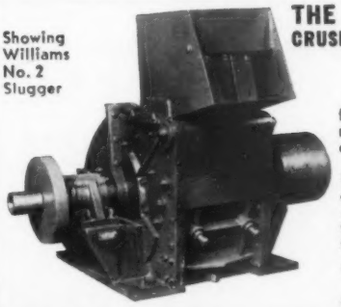
DUCON Gas and Air Washers will completely and economically rid your plant of the Dust Menace. They are remarkably simple, with no wearing parts to get out of order. They insure continuous operation and positive control, and give efficiencies up to 99.7%. Have no moving parts, no filters or screens, and require no labor or maintenance. Available in 2 types, capacities up to 25000 C.F.M.

Type B is used where dust is collected in Washer. Type A is used with Ducon Cyclone Dust Collectors or stacks.

Write for Information

THE DUCON COMPANY

6602-51st Road WOODSIDE, L. I., N. Y.



Showing Williams No. 2 Slugger

THE WILLIAMS "SLUGGER" CRUSHER *for* MAKING 1¼", ¾" OR AGSTONE HANDLES LARGE STONE

Rows of heavy, free swinging, fast revolving hammers, crush the material by impact until of proper size to pass through the grates. By reducing large rock to 1¼", ¾" or agricultural size in one operation, the "Slugger" has enabled operators to produce these sizes at a very low cost per ton and with small investment.

WILLIAMS PATENT CRUSHER AND PULVERIZER COMPANY
802 St. Louis Ave. - St. Louis, Mo.

Williams
PATENT CRUSHERS GRINDERS SHREDDERS

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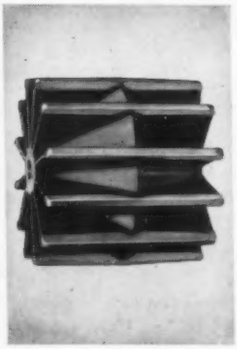

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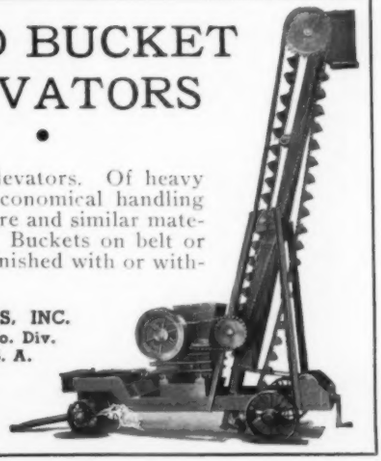

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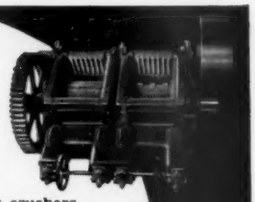

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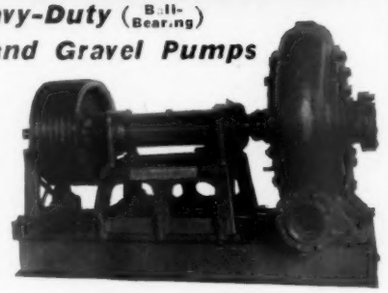

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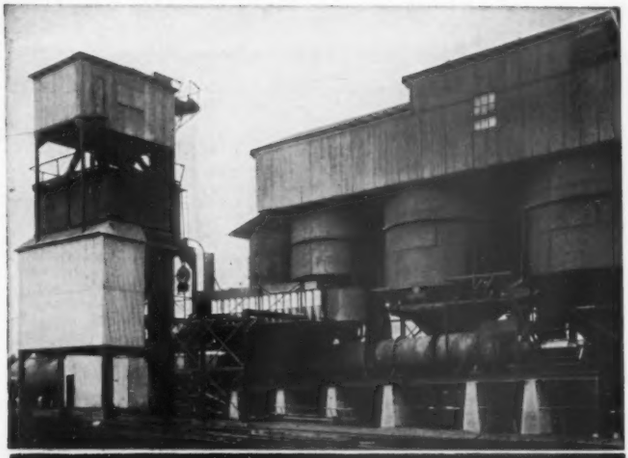

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12-Ton Vulcan. 36" Gauge, Serial 3693 and 3658 with Hercules Engines Serial 100021-3. PRICE: $500.00 each. F. O. B. St. Louis, Mo.

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Cement Plant Executive—Age 35—With twenty years' experience in the manufacture of Portland, special and masonry cements, desires connection with progressive concern regardless as to location. Has worked in various cement plants in the capacity of Chemist, Plant Superintendent, and General Manager, and during past ten years has done considerable work in the development of special cements and the designing of equipment for their manufacture.
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Used portable belt conveyors, and screw conveyors.

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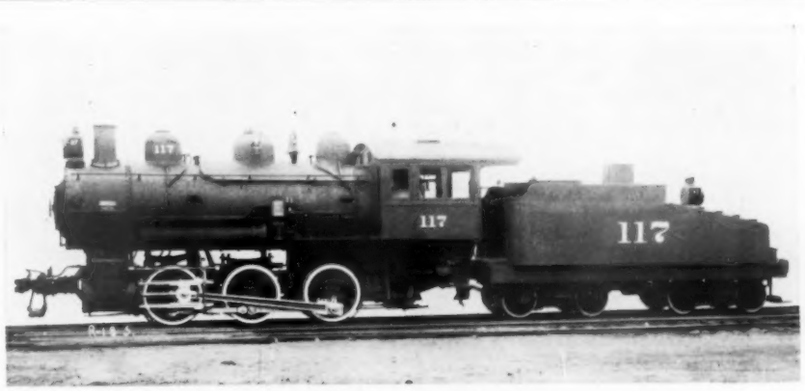

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Two Switching Locomotives as above

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Kent Maxecon and Bradley Mills.

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42"x48" Traylor; 15x30, 18x36, 24x36, 30x42, Farrel; 24"x36", 36x48 Allis-Chalmers; 30x42 Buchanan.

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3' Traylor; 4' Traylor No. 410-TZ; 5" Newhouse with 40 H.P. motor; Nos. 19, 25, 37, 49 Kennedy.

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5—5'x10' Symons Screens, 2-deck, each with 7½ H.P. 3/60/440 volt motor.
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8—Tyler Hummers, 3'x5', 4x5, 4x7, 1 to 3 decks.

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16-ton Whitcomb Gasoline Locomotive, standard gauge, 6-cylinder, 6x7 motor, self-starter. 90% new. Running demonstration.

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25-ton capacity Ohio, 8 wheel, standard gauge, ASME boiler, double drum, 50 ft. boom.

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1—5x35' Indirect Heat, double shell.

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36x24" Farrell, 15-B
36"x24" Blake Type
36"x18" Buchanan, Steel Frame
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No. 1'8" Traylor "TY" Steel Frame
No. 6 Traylor "TZ" Finishing Crusher
No. 2F Telsmith Reduction
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9 x 18 DIAMOND Roller Bearing Jaw Crusher
10 x 20 " " " " "
10 x 36 " " " " "
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2'0" x 4'0" single deck DIAMOND vibrating screen

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1—DIAMOND 9 x 16 Bronze Bearing Jaw Crusher mounted on truck with 15-20 H.P. engine. Special price for quick sale.

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Portable and stationary, belt with elec. or gas power, sizes from 20 cu. ft. to 1,000 cu. ft.

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1—Set of Allis Chalmers, smooth type crushing rolls, 42x16".

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4—13 yd. LeTourneau Type RY scrapers with Caterpillar RD8 Diesel tractors, new 1938.

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1—Mod. 75 Wiley Whirley No. 2973, 20 tons cap., 75' boom, 3 D Clyde 80 HP elec. hoist and 30 HP elec. swinger, all complete. Perfect condition.

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Belt, Idlers, Chain, Buckets, Pulleys, etc.
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Selected Sizes Centrif. Elect. Water Pumps.
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Cletrac No. 40 Tractor, 40-hp. motor, On Cats.

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2—3x5 Hummers 1-deck, V16 Vibrator Heads.
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3—4x8 Robins 2-deck, Gyrex types.
3x5 & 4x5 New Assorted Wire Screen Sections.

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85 Ton American 2-8-0 separate tender, 21x28" cylinders.

80 Ton Baldwin 8-wheel switcher, 0-8-0 separate tender, 21x28" cylinders.

82 Ton American 6-wheel switcher, 0-6-0 separate tender, 21x28" cylinders.

75 Ton Baldwin 6-wheel switcher, 0-6-0 separate tender, 21x26" cylinders.

72 Ton Baldwin 6-wheel switcher, 0-6-0 separate tender, 20x26" cylinders.

60 Ton Baldwin 6-wheel switcher, 0-6-0 separate tender, 19x26" cylinders.

50 Ton Baldwin 6-wheel switcher, 0-6-0 separate tender, 17x24" cylinders.

Complete Stock List on Request

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225 bbl. Erie bulk cement plant, complete.
155 bbl. Fuller cement bin, electric batcher.
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Steel Frames: 2,000 ft. 24 In., 30 In. & 36 In. Sections

ROTARY DRYERS AND KILNS

36 In. x 20 Ft., 3 Ft. x 30 Ft., 4 Ft. x 30 Ft., 54 In. x 30 Ft., 42 In. x 24 Ft., 5 Ft. x 30 Ft., 4 ft. x 16 Ft., 5 Ft. x 60 Ft., 6 Ft. x 60 Ft., 8 Ft. x 70 Ft., 70 In. x 40 Ft.

STEEL DERRICKS

GUY: 8 Ton 85 Ft. Boom, 15 Ton 100 Ft. Boom, 20 Ton 115 Ft. Boom, 50 Ton 100 Ft. Boom
STIFF LEG: 5 Ton 70 Ft. Boom, 15 Ton 100 Ft. Boom, 25 Ton 100 Ft. Boom, 75 Ton 135 Ft. Boom

LOCOMOTIVES

GASOLINE: 3 Ton, 5 Ton, 8 Ton, 12, 14 & 30 Ton
STEAM: 9 Ton, 20 Ton, 40 Ton, 60 Ton & 80 Ton.
ELECTRIC: 2 Ton, 5 Ton, 8 Ton, 17 Ton & 40 Ton

SCREENS

VIBRATING: 2x4, 3x6, 2x8, 3x8, 3x5, 4x5, 4x8, 4x10, 48x72, HUMMER, ROTEX, NIAGARA & ROBINS
REVOLVING: 3x12, 3x16, 5½x18, 3x24, 4x16, 4x20, 4x23, 4x24, 5x30, 5x20, 6x20

SAND WASHERS AND CLASSIFIERS

4 LINK-BELT A-60 In. Classifiers.
7 ALLEN Cones 4 Ft., 5 Ft., 6 Ft., 8 Ft. TELSMITH 13 Ft. by 2 Ft. 8 In. Screw Washer.

RAILROAD CARS

12—50 Ton Cap. Battleship Gondolas.
7—50 Ton Cap. Flat Cars.

SAUERMAN DRAG AND SLACKLINES

1—¾ yd. Gas 1—1½ yd. Electric
1—1 yd. Electric 3—2 yd., 3 yd. & 4 yd. Electric

R. C. STANHOPE, INC.

(Cable Address: "STANEQUIP" New York)
575 6TH AVENUE, NEW YORK, N. Y.
Pennsylvania 6-3565 or 6-3566

BINS: Bulk Cement Bin, 223 Bbl. capacity; also one 85 ton, 2 compartment, Material Bin, all steel.

BULK CEMENT UNLOADER: Fuller Kinyon, portable, self-propelled, with built-in motor, 40 H.P.-A.C., complete.

BUCKETS: Blaw-Knox 2 yd. and 3 yd. capacity, Clam Shell; one Hayward 3 yd. capacity Orange Peel.

CARS: Six Clark 30 yd. capacity, standard gauge, all steel, 2-way air dump cars, apron type doors; Six Kopple 12 yd. all steel, standard gauge, hand dump cars; ten 50 ton, all steel, hopper bottom gondola cars.

BOILERS: 100 H.P. Farquhar, locomotive type, on skids, National Board, 125 lbs. pressure; also one 40 H.P. Locomotive type, 190 lbs. pressure.

COMPRESSORS: One Ingersoll-Rand 320 cu. ft. portable, gas, on steel wheels.

CRUSHER SPECIALS: Two 24 x 36; one 13 x 30 Jaw Crushers. One Kennedy 25 Reduction Crusher, with 50 H.P. vertical motor, V-belt drive. One Allis Chalmers 13"; and one 30" Superior McCully Gyratory Crusher.

CRUSHER ROLLS: Two 16 x 36; one 16 x 42; one 24 x 54.

BELT CONVEYOR: One 36" x 200'.

DIESEL ENGINE: One 450 H.P. Cooper-Bessemer, 4 cylinder, 4 cycle, solid injection, 225 R.P.M., with or without 300 K.W.-A.C. Generator, 2300 volt, complete with all auxiliary equipment.

DREDGE PUMPS: One Morris 6" with 75 H.P., A.C. 220 volt, variable speed motor; also one Morris 10" Belt Drive.

DRILL SHARPENER: Ingersoll-Rand size 50, with Dies and Dollies for hollow, round, and Hex steel.

DRYER: One Ruggles Cole Double shell, 8'6" x 86'.

HOIST: Sullivan double drum, 50 H.P. electric, for sluicing and drag scraper work; one National 3 drum with swinger attached, with or without 65 H.P. Buda motor.

LOCOMOTIVES: Gasoline, 14 ton Whitcomb, 36" gauge, also one 25 ton Vulcan. Standard gauge.

KILNS: Two 7'6" x 100' and two 6' x 100'.

MAGNETIC PULLEY: 24" Dia., 48" Belt.

PUMP: One Fairbanks-Morse centrifugal, direct connected to 40 H.P.-A.C. Motor, capacity 1200 G.P.M. at 96' head.

PULVERIZERS: One Sturtevant No. 1 Ring Roll Mill. One Raymond Five Roller High Side Mill.

SCREENS: 3 x 6; and 3 x 8, double deck Vibrator V-belt drive; one 60" x 20' revolving screen for scalping or scrubbing, with one section blind; also two 48" x 24' sizing screens, with 7' diameter outer jacket. One Link-Belt 3 x 5, single deck, heavy duty.

SLACKLINES: Sauerman, 75 H.P. electric, 90' mast, ¾ yd. bucket cables, etc.

TRACKSHIFTER: One Nordberg Model N, 4 cylinder, Hercules Motor, complete with boom for loading and laying rail.

TRACK: 600 ft. of 24" gauge, portable track, with switches and fifteen 1 yd. capacity all steel cars.

A. J. O'NEILL
Lansdowne Theatre Bldg.—Lansdowne, Pa.
Philadelphia 'Phone—Madison 7578

SHOVELS—CRANES

1—Lorain-77 Diesel Shovel 1½-yd. 1937

1—Lima 602 Gas Shovel 1½-yd. 1936.

1—Lorain-57 Electric Tunnel Shovel 1-yd.

1—P. & H. 600 Gas Shovel & Backhoe 1-yd.

1—Lorain 75-B Shovel attachment 1¼-yd.

1—Lorain-40 Gas Crawler Shovel ¾-yd. and 35' Crane Boom, reconditioned.

1—Mead-Morrison Gas Shovel ¾-yd.—½-yd. Backhoe—35' Crane Boom, bargain.

1—Byers "Bulldog" full rev. Gas Backhoe and Crane 1931, 2 Backhoe Buckets 25" and 37" wide, 30-45' Crane Boom, first class.

1—Link-Belt K-48 Gas Crane and Dragline, 60-70-90' Boom, new 1936, excellent cond.

1—Lorain-77 Diesel Crane or Dragline, 50' Bm., 20-ton cap. new 1936.

2—Northwest No. 4 Gas Cranes and Draglines, 50-70' Boom, 1 Backhoe attach., 1930 and 1932.

1—Universal Truck-Crane No. 1400 solids.

1—Lorain-40 Truck-Crane, pneumatics.

GREY STEEL PRODUCTS CO., Inc.
74 Central Ave., Glen Rock, N. J.
Tel. Ridgewood 6-2275

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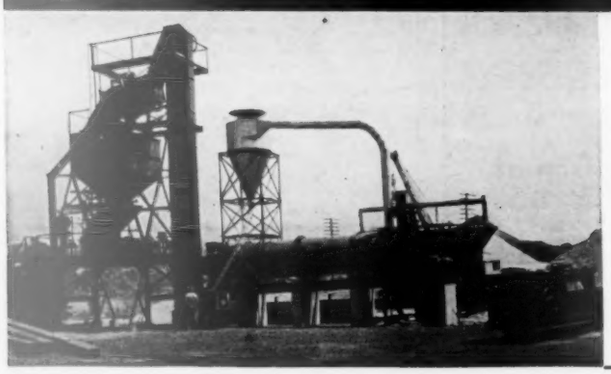

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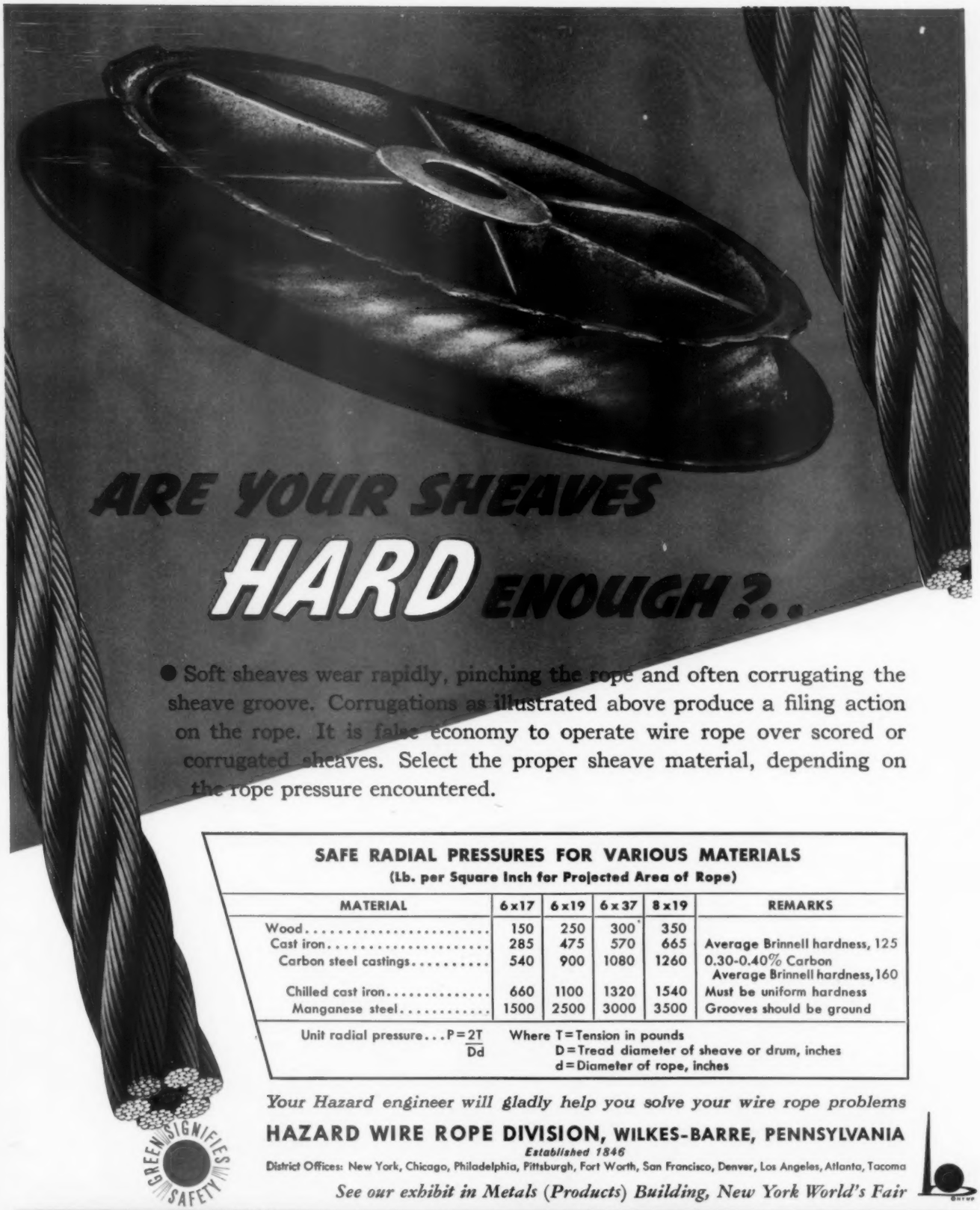

ARE YOUR SHEAVES HARD ENOUGH?..

● Soft sheaves wear rapidly, pinching the rope and often corrugating the sheave groove. Corrugations as illustrated above produce a filing action on the rope. It is false economy to operate wire rope over scored or corrugated sheaves. Select the proper sheave material, depending on the rope pressure encountered.

SAFE RADIAL PRESSURES FOR VARIOUS MATERIALS
(Lb. per Square Inch for Projected Area of Rope)

MATERIAL	6x17	6x19	6x37	8x19	REMARKS
Wood	150	250	300	350	
Cast iron	285	475	570	665	Average Brinnell hardness, 125
Carbon steel castings	540	900	1080	1260	0.30-0.40% Carbon Average Brinnell hardness, 160
Chilled cast iron	660	1100	1320	1540	Must be uniform hardness
Manganese steel	1500	2500	3000	3500	Grooves should be ground

Unit radial pressure... $P = \frac{2T}{Dd}$ Where T = Tension in pounds
D = Tread diameter of sheave or drum, inches
d = Diameter of rope, inches

GREEN SIGNIFIES SAFETY

Your Hazard engineer will gladly help you solve your wire rope problems

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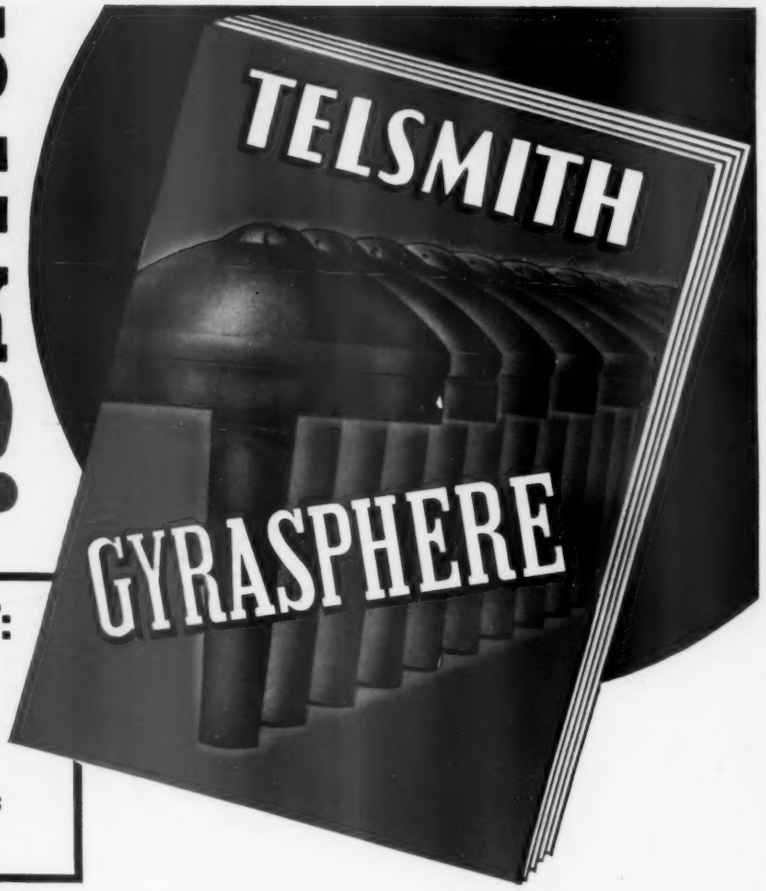

IT TELLS YOU HOW TO GET:

- a wider range of sizes
- finer crushing
- increased tonnage
- more cubical aggregate
- fewer oversize slabs and splinters
- lower power and upkeep costs

● THIS BOOK is written for the man who wants *the real dope* on secondary crushing—the man who has to have the cold facts before he lays down the cold cash.

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How oil leakage is effectively prevented. *Why* grit and water positively cannot get into the bearings. *How* oil and maintenance costs are cut as they were never cut before.

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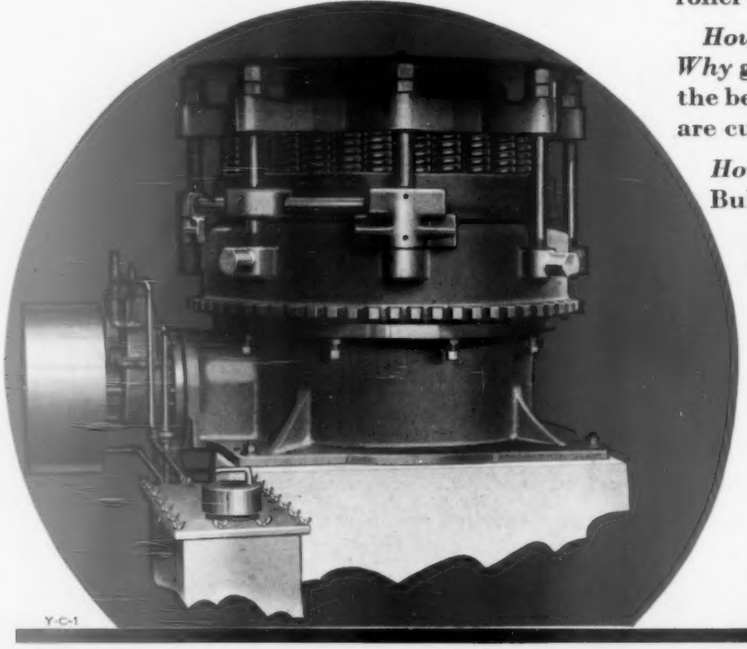

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